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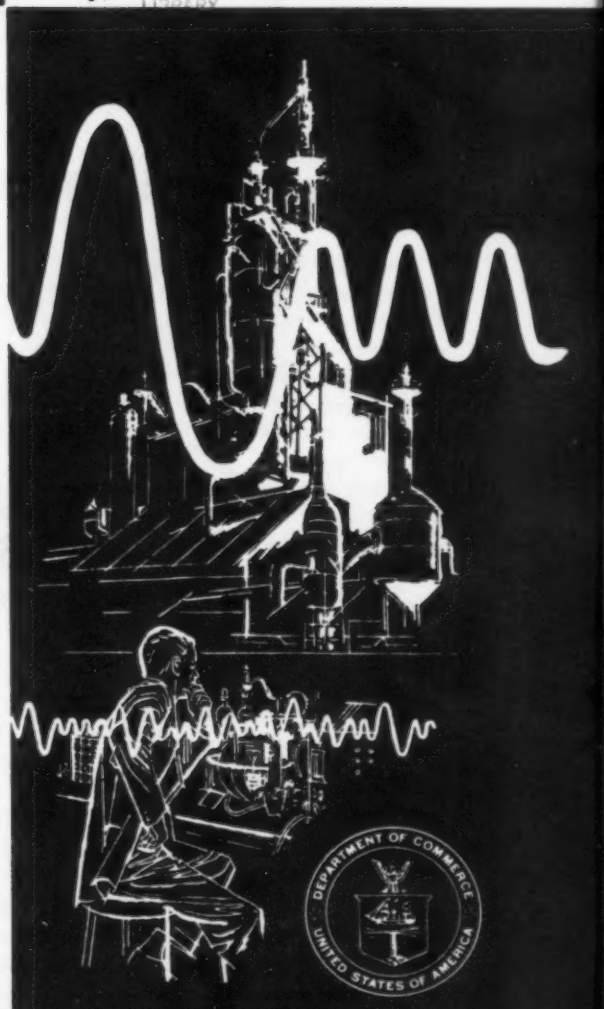

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U.S. DEPARTMENT OF COMMERCE
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CONTENTS

PAGE NOS.

SUBJECT INDEX NI-1

SUBJECT DIVISIONS

1 AIRCRAFT AND FLIGHT EQUIPMENT 1
2 ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY 3
3 CHEMICAL WARFARE EQUIPMENT AND MATERIALS ... 9
4 CHEMISTRY 9
5 COMMUNICATIONS 13
6 DETECTION 14
7 ELECTRICAL EQUIPMENT 14
8 ELECTRONICS AND ELECTRONIC EQUIPMENT 17
9 FLUID MECHANICS 28
10 FUELS AND COMBUSTION 33
11 GROUND TRANSPORTATION EQUIPMENT 33
12 GUIDED MISSILES 34
13 INSTALLATIONS AND CONSTRUCTION 37
14 MATERIALS (NON-METALLIC) 38
15 MATHEMATICS 41
16 MEDICAL SCIENCES 44
17 METALLURGY 51
18 MILITARY SCIENCES AND OPERATIONS 55
19 NAVIGATION 56
20 NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY 57
21 NUCLEAR PROPULSION ..... No Entries
22 ORDNANCE 60
23 PERSONNEL AND TRAINING 61
24 PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES 62
25 PHYSICS 63
26 PRODUCTION AND MANAGEMENT 70
27 PROPULSION SYSTEMS 72
28 PSYCHOLOGY AND HUMAN ENGINEERING 74
29 QUARTERMASTER EQUIPMENT AND SUPPLIES 76
30 RESEARCH AND RESEARCH EQUIPMENT 77
31 SHIPS AND MARINE EQUIPMENT 84
32 MISCELLANEOUS ARTS AND SCIENCES 85
33 TRANSPORTATION 87

CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

BIBLIOGRAPHY	S-1
AGRICULTURE	S-1
ASTRONOMY	S-1
BEHAVIORAL SCIENCES	S-2
BIOLOGICAL SCIENCES	S-2
CHEMISTRY	S-3
EARTH SCIENCES	S-4
ENGINEERING	S-5
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-11
MATERIALS	S-11
MATHEMATICS	S-12
MECHANICS	S-13
METALLURGY	S-14
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-14
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	S-21
PHYSICS	S-22
SOCIAL SCIENCES	S-25
AD INDEX	S-27
NUMBER INDEX	S-29
SUBJECT INDEX	S-31

This issue includes:

TAB 63 - 3 - 3
AD 402 500 - AD 403 499

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

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Salt Lake City, Utah 84100

SUBJECT INDEX

*ABSTRACTS
REPORTS

INFORMATION ON FORECASTING ANOMALOUS PROPAGATION CONDITIONS FOR IMPROVING RADIO COMMUNI-
AD-603 140 DIV. 2

*ACOUSTIC INSULATION
ANECHOIC CHAMBERS

DEVELOPMENT OF A SUITABLE ANECHOIC TREATMENT FOR THE ASD SONIC FATIGUE FACILITY.
AD-402 997 DIV. 25

*ADAPTIVE CONTROL SYSTEMS
CYBERNETICS

COMPUTER-BASED METHODOLOGY FOR SYSTEM DEVELOPMENT, SITE PRODUCTION AND REDUCTION SYSTEM.
AD-603 384 DIV. 30

*ADAPTIVE CONTROL SYSTEMS
DESIGN

NOTES ON SYSTEM THEORY: DEVELOPMENT AS A BASIC SCIENTIFIC DISCIPLINE.
AD-603 430 DIV. 30

*ADAPTIVE CONTROL SYSTEMS
LAUNCH VEHICLES (AEROSPACE)

SIMPLIFIED ANALYSIS OF FLEXIBLE BOOSTER ADAPTIVE FLIGHT CONTROL SYSTEMS.
AD-603 433 DIV. 12

*ADSORPTION
GASES

SELECTED ARTICLES TRANSLATED FROM UKRAINIAN JOURNAL OF PHYSICS, VOL. 7, NO. 2.
AD-402 587 DIV. 25

*ADSORPTION
LOW PRESSURE RESEARCH

STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
AD-402 932 DIV. 25

*AEROBIOLOGY
LABORATORY EQUIPMENT

PROCEDURES FOR USE OF THE HENDERSON APPARATUS FOR STUDY OF INFECTIOUS DISEASE TRANSMISSION BY THE RESPIRATORY ROUTE.
AD-402 787 DIV. 30

*AEROSOLS
SCATTERING

ANGULAR SCATTERING DIAGRAMS CONSTRUCTED FOR SPHERICAL AEROSOLS OF REFRACTIVE INDEX N = 1.5.
AD-402 803 DIV. 25

*AEROSPACE CRAFT
FIBER OPTICS

FIBER OPTICS IN AEROSPACE VEHICLE HAZARD DETECTION.
AD-603 387 DIV. 12

*AIR
REFRACTIVE INDEX

DERIVATION OF FORMULAS TO EXPRESS QUANTITATIVELY THE THEORY OF ATMOSPHERIC SEEING.
AD-603 102 DIV. 2

*AIR CONDITIONING EQUIPMENT
ACCEPTABILITY

OPERATIONAL TEST AND EVALUATION OF AN/ASC-2 AIR CONDITIONER FOR PORTABLE AIR WEAPONS CONTROL SHELTERS.
AD-603 325 DIV. 13

*AIR FORCE PROCUREMENT

A TALK ON SOME SUGGESTED CHANGES IN R AND D STRATEGY, WITH IMPLICATIONS FOR CONTRACTING.
AD-402 992 DIV. 32

*AIR FORCE RESEARCH
ABSTRACTS

QUARTERLY INDEX AND ABSTRACTS OF AFSC
AD-603 112 DIV. 32

*AIR FORCE SYSTEMS COMMAND
ABSTRACTS

QUARTERLY INDEX AND ABSTRACTS OF AFSC
AD-603 112 DIV. 32

*AIR MASS ANALYSIS

A BAROTROPIC WEATHER PREDICTION MODEL WITH A CONSISTENT ENERGY INTEGRAL.
AD-603 461 DIV. 2

*AIR MASS ANALYSIS
ATMOSPHERIC SOUNDING

SYNOPTICAL MEASUREMENTS WERE MADE OF THE VERTICAL OZONE DISTRIBUTION. THE CORRELATION OF THE OZONE VARIATION WITH THE WEATHER SITUATION WAS STUDIED.
AD-603 398 DIV. 2

*AIR TRAFFIC CONTROL SYSTEMS

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF FLIGHT DATA MESSAGE.
AD-603 423 DIV. 30

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF MESSAGES. COMPUTER ROUTINES FOR THE SYSTEM ARE PRESENTED.
AD-603 486 DIV. 30

FLOW CHARTS, SYSTEM DIAGRAMS, AND COMPUTER ROUTINE DIAGRAMS FOR COMPUTER PROGRAMMING OF PHASE I FASTER PROGRAM OF PROJECT NO. 10-4027(FAA). VOL. II-APPENDIXES.
AD-603 495 DIV. 30

*AIRCRAFT
MOTION

ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT.
AD-402 608 DIV. 1

*AIRCRAFT CARRIERS
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, ICEBREAKERS, AND TUGS.
AD-603 060 DIV. 31

*AIRCRAFT DEFENSE SYSTEMS
OPERATIONS RESEARCH

OPERATIONS RESEARCH IN PRODUCTION OF SYSTEM TRAINING EXERCISES.
AD-402 624 DIV. 30

*AIRFRAMES
STRESSES

ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT.
AD-402 608 DIV. 1

*AIRPLANE LANDINGS
VISIBILITY

STUDIES IN THE FIELD OF APPROACH VISIBILITY MEASUREMENT AND INSTRUMENTATION.
AD-603 075 DIV. 33

*ALGAE
CLOSED-CYCLE ECOLOGICAL SYSTEMS

THE FEASIBILITY OF USING SEVERAL TYPES OF ORGANISMS TO MAINTAIN A GASEOUS BALANCE IN A CLOSED SYSTEM IS DISCUSSED.
AD-402 759 DIV. 18

*ALGEBRAIC TOPOLOGY

BRACKET AND EXPONENTIAL FOR A NEW TYPE OF VECTOR FIELD IS STUDIED.
AD-402 806 DIV. 15

*ALKALI METAL COMPOUNDS
PHOSPHATES

NUCLEAR MAGNETIC RESONANCE STUDY OF THE DYNAMIC STRUCTURE OF SODIUM-, POTASSIUM-, CESIUM-, AND THALLIUM HEXAFLUOROPHOSPHATES BETWEEN 77 AND 800 K.
AD-603 410 DIV. 25

*ALLOYS
MATERIAL FORMING

ABSTRACTS OF OVER 200 REFERENCES ON THE EFFECT OF HIGH-VELOCITY STRAINING.
AD-603 493 DIV. 17

*ALLOYS
POWDER METALLURGY

RESULTS OF SINTERING STUDIES ON ATOMIZED AND SYNTHESIZED ALLOY POWDERS; OPTIMUM SINTERING CONDITIONS DEFINED.
AD-402 780 DIV. 17

*ALUMINUM COMPOUNDS
HEAT OF FORMATION

HEAT OF FORMATION OF LITHIUM ALUMINUM HYDRIDE FROM HEATS OF SOLUTION OF ALUMINUM, LITHIUM, AND LITHIUM ALUMINUM HYDRIDE.
AD-603 346 DIV. 4

*ALUMINUM COMPOUNDS
OXIDES

THE ANALYSIS OF FRACTURES OF GERMANIUM AND ALUMINUM SINGLE CRYSTALS AND POLYCRYSTALS.
AD-402 972 DIV. 17

*AMMONIUM COMPOUNDS
SYNTHESIS (CHEMISTRY)

PREPARATION OF CARBON-14 LABELED TETRAMETHYLAMMONIUM BROMIDE. CONDENSATION OF C-14 METHYL BROMIDE WITH TRIMETHYLAMINE. INDEPENDENCE OF YIELD (RANGE OF 100% THEORY) WITH VARYING AMOUNTS OF TRIMETHYLAMINE.
AD-603 407 DIV. 4

*AMPHIBIOUS OPERATIONS
GROUND EFFECT MACHINES

FEASIBILITY FOR EMPLOYMENT OF GROUND EFFECTS MACHINES IN AMPHIBIOUS OPERATIONS.
AD-402 772 DIV. 18

*AMPHIBIOUS VEHICLES
CARGO VEHICLES

A STUDY OF THE OPERATIONAL FEASIBILITY OF THE GROUND EFFECT MACHINE IN THE AMPHIBIOUS SUPPORT MISSION.
AD-402 678 DIV. 31

*ANALOG COMPUTERS

DEVELOPMENT OF AN ANALOG COMPUTING TECHNIQUE FOR MEASURING TIME-VARYING POWER SPECTRA OF SEISMIC SIGNALS.
AD-603 084 DIV. 2

*ANALYSIS
MATHEMATICS

A STUDY OF INVARIANCE OF SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS UNDER K-VECTOR FIELDS.
AD-402 804 DIV. 15

*ANCHORS (STRUCTURAL)

RAPID EMPLACEMENT AND RETRIEVING DEVICE FOR GROUND STAKES GP-1137/G AND GP-1137/G.
AD-402 789 DIV. 30

*ANTENNA LOBES
REDUCTION

REDUCTION OF SIDELOBES AND POINTING ERRORS IN PHASED ARRAY RADARS BY RANDOMIZING QUANTIZATION STEPS.
AD-402 953 DIV. 8

*ANTENNA RADIATION PATTERNS
MEASUREMENT

THE GENERAL REQUIREMENTS AND LAYOUT OF AN ANTENNA TEST RANGE ARE DESCRIBED TO INCLUDE FACILITY CONSTRUCTION PLANS AND INSTRUMENTATION.
AD-402 682 DIV. 8

*ANTENNAS
HIGH FREQUENCY

EFFECTIVENESS OF HF LOGARITHMICALLY PERIODIC ANTENNAS FOR USE BY THE FAA R&D SERVICE.
AD-603 033 DIV. 8

*ANTICYCLONES

CYCLONE AND ANTICYCLONE PERIODIC VARIATIONS ON METEOROLOGICAL CHARTS FOR AREA SOUTH OF 50 DEG SOUTH.
AD-603 143 DIV. 2

*ANTIFERROMAGNETISM
SINGLE CRYSTALS

ANTIFERROMAGNETIC BEHAVIOR IN SINGLE CRYSTALS.
AD-402 784 DIV. 25

*ANTIFRICTION BEARINGS
FILMS

FEASIBILITY OF SUBSTITUTING FLUID FILM BEARINGS FOR CONVENTIONAL ROLLING-ELEMENT TYPE BEARINGS IN SPACECRAFT AUXILIARY POWER ACCESSORIES.
AD-402 735 DIV. 7

*ANTIGENS & ANTIBODIES

TRANSLATION OF FOREIGN RESEARCH: SIGNIFICANCE OF PLASMA CELLS IN ALTERATION FORMATION PROCESS DURING IONIZING RADIATION.
AD-402 518 DIV. 1A

*ANTIRAIN AGENTS
CATALYSTS

RAIN REPELLENT. SILICONE-TITANIUM COPOLYMERS PASTE AND LIQUID CATALYSTS. RE-EVALUATION OF SURFACE ACTIVE AGENTS IN CONJUNCTION WITH FLUOROALKYLTRIMETHOXYSILANE.
AD-402 667 DIV. 4

*ANTITANK GUNS
SPOTTING RIFLES

METHOD FOR COMPUTING THE FIRST ROUND HIT PROBABILITY FOR AN ANTITANK WEAPON WITH SPOTTING RIFLE CONTROL.
AD-402 808 DIV. 22

*ARTIC TESTS
ARMY EQUIPMENT

U. S. ARMY ARCTIC TEST BOARD REPORT APRIL-MAY 62-MEMORANDUM.
AD-403 326 DIV. 30

*ARMOR
COMPOSITE MATERIALS

FINAL REPORT: PROGRAMMED AND COMPUTING SERVICE FOR EVALUATION OF COMPOSITE ARMOR.
AD-403 263 DIV. 22

*ARMY EQUIPMENT
ARTIC TESTS

U. S. ARMY ARCTIC TEST BOARD REPORT APRIL-MAY 62-MEMORANDUM.
AD-403 326 DIV. 30

*ARSENIDES
FILMS

GALLIUM ARSENIDE EPITAXIAL FILM GROWTH.
AD-402 677 DIV. 8

*ARTHROPODS
DISEASE VECTORS

RESEARCH PROJECTS OF THE SEATO MEDICAL LABORATORY. VECTOR-BORNE DISEASES OF THAILAND.
AD-402 923 DIV. 1A

*ASPHERICAL LENSES
MANUFACTURING METHODS

THE DEVELOPMENT OF PRODUCTION MANUFACTURING METHODS FOR EXTREMELY ACCURATE ASPHERIC LENS SURFACES.
AD-402 952 DIV. 2A

*ASTRONAUTS
TRAINING

ZERO GRAVITY INDOCTRINATION FOR THE GEMINI/APOLLO ASTRONAUTS.
AD-402 786 DIV. 2A

*ATMOSPHERE
GASES

DISSIPATION EFFECTS CONTROLLING THE ELECTRICAL MORPHOLOGY OF THE MESOSPHERE.
AD-403 335 DIV. 2

*ATMOSPHERE MODELS

A DIDACTIC WEATHER PREDICTION MODEL WITH A CONSISTENT ENERGY INTEGRAL.
AD-403 461 DIV. 2

*ATMOSPHERIC ELECTRICITY

DISSIPATION EFFECTS CONTROLLING THE ELECTRICAL MORPHOLOGY OF THE MESOSPHERE.
AD-403 335 DIV. 2

*ATMOSPHERIC MOTION
WIND

WIND, WIND SHEAR AND TURBULENCE REPRESENTATION FOR ATMOSPHERIC BALLISTICS.
AD-403 114 DIV. 2

*ATMOSPHERIC POLLUTION

BRIGHTNESS OF THE SKY IN THE VICINITY OF THE SUN.
AD-403 103 DIV. 2

*ATMOSPHERIC REFRACTION
MATHEMATICAL ANALYSIS

DERIVATION OF FORMULAS TO EXPRESS QUANTITATIVELY THE THEORY OF ATMOSPHERIC SEEING.
AD-403 102 DIV. 2

*ATTENTION
PSYCHOMETRICS

SUBJECTIVE REACTIONS OF VIGILANCE PERFORMERS, HUMAN FACTOR PROBLEMS IN ANTI-SUBMARINE WARFARE.
AD-403 026 DIV. 5A

*AUDIOMETRY
TEST METHODS

THE A. I. U. AUDITORY TEST NUMBER 4: A TEST FOR SPEECH DISCRIMINATION COMPOSED OF CVC MONOSYLLABIC WORDS.
AD-403 275 DIV. 1A

*AUTOMATION

TRANSLATIONS OF RUSSIAN ARTICLES A CYBERNETIC AND AUTOMATIC CONTROL.
AD-402 521 DIV. 2A

*AUXILIARY POWER PLANTS
ANTIFRICTION BEARINGS

FEASIBILITY OF SUBSTITUTING FLUID FILM BEARINGS FOR CONVENTIONAL ROLLING-ELEMENT TYPE BEARINGS IN SPACECRAFT AUXILIARY POWER ACCESSORIES.
AD-402 735 DIV. 7

*AUXILIARY POWER PLANTS
SOLAR RADIATION

A 3-KW STIRLING CYCLE SOLAR ENGINE: SECOND QUARTERLY PROGRESS REPORT.
AD-402 737 DIV. 7

(A 3-KW STIRLING CYCLE SOLAR ENGINE: MONTHLY PROGRESS REPORT FOR SEPTEMBER 1961.
AD-402 738 DIV. 27

*AZIMUTH
TRANSFORMATIONS (MATHEMATICS)

DERIVATION OF EXACT FORMULAS FOR CORRECTING RADAR ANGLE DATA FOR ERRORS CAUSED BY NON-PERPENDICULARITY OF THE RADAR AXES.
AD-403 489 DIV. 4

BACTERIOPHAGE
DESOXYRIBONUCLEIC ACIDS

GENETIC ANALYSIS OF MICROORGANISM OF MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OF BACTERIA DNA.
AD-403 108 DIV. 1A

*BALLOONS
FLIGHT PATHS

FLIGHT DATA ON BALLOON OBSERVATIONS OF IR OBSERVATIONS OF THE SUN ON JULY 14, 1962.
AD-403 332 DIV. 3

*BALLOONS
SCIENTIFIC RESEARCH

FLIGHT DATA ON BALLOON OBSERVATIONS OF IR OBSERVATIONS OF THE SUN ON JULY 14, 1962.
AD-403 332 DIV. 3

*BATTERIES & COMPONENTS
SILVER

SILVER-CADMIUM BATTERY PROGRAM. SEPARATOR STUDIES. SILVER ELECTRODE CALCULATION OF ELECTROLYTE VOLUME. PRESSURE DECAY. CHARGING PROBLEMS. ELECTRICAL TESTING. ENVIRONMENTAL TESTING.
AD-402 981 DIV. 7

*BATTERY CHARGERS
HANDBOOKS

ENGINEERING REPORT AND HANDBOOK OF SIGNAL CORPS BATTERY CHARGING SYSTEM.
AD-403 465 DIV. 7

*BEARINGS
GENERATORS

FEASIBILITY OF SUBSTITUTING FLUID FILM BEARINGS FOR CONVENTIONAL ROLLING-ELEMENT TYPE BEARINGS IN SPACECRAFT AUXILIARY POWER ACCESSORIES.
AD-402 735 DIV. 7

*BEHAVIOR
MATHEMATICAL ANALYSIS

PATTERN-PERCEIVING AND LEARNING NETWORKS: NETWORKS FOR SELECTING PATTERNED INPUTS AND OUTPUTS. COMPUTER MODEL OF SENSORIMOTOR DEVELOPMENT. MATHEMATICAL THEORY OF SENSORIMOTOR ORGANIZATION AND PERCEPTION.
AD-403 494 DIV. 2B

*BEHAVIOR
REACTION (PSYCHOLOGY)

TRIPLE RESPONSE LOCI IN SOCIAL INFLUENCE SITUATIONS: CONFORMITY, INDEPENDENCE, AND ANTI-CONFORMITY.
AD-403 463 DIV. 4B

*BEHAVIOR
THEORY

EXPERIMENTAL STUDY OF THREE RESPONSE MODES IN SOCIAL SITUATIONS: CONFORMITY, INDEPENDENCE, AND ANTICONFORMITY.
AD-402 791 DIV. 2B

*BERYLLIUM
DEFORMATION

THE DEFORMATION CHARACTERISTICS OF BERYLLIUM AND TUNGSTEN UNDER CONDITIONS OF HIGH HYDROSTATIC PRESSURE.
AD-403 144 DIV. 17

*BERYLLIUM
GASES

SOLUBILITY AND DIFFUSION OF GASES IN BERYLLIUM.
AD-403 370 DIV. 17

*BESSEL FUNCTIONS
TRANSFORMATIONS (MATHEMATICS)

REPRESENTATIVE FORMULAS FOR THE STUDY OF FUNCTIONAL SPACES.
AD-403 490 DIV. 15

BIBLIOGRAPHIES

ABSTRACTS OF OVER 700 REFERENCES ON THE SUBJECT OF HIGH-VELOCITY METALWORKING.
AD-403 493 DIV. 2A

BIBLIOGRAPHIES
ABSTRACTS

A BIBLIOGRAPHY ON RISE TIME AND HIGH RANGE OF VERY SHORT ELECTRICAL PULSES.
AD-403 137 DIV. 2B

BIBLIOGRAPHIES
DIPTERA

INDEXED BIBLIOGRAPHY TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY.
AD-402 794 DIV. 1A

BIBLIOGRAPHIES
INDEXES

INDEX TO A BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINE LOW TEMPERATURE PROBLEMS.
AD-402 666 DIV. 27

BIBLIOGRAPHIES
NAVAL RESEARCH

A BIBLIOGRAPHY OF UNCLASSIFIED NRL FORMAL REPORTS: NUMBERS 5000-5700.
AD-402 910 DIV. 32

BIBLIOGRAPHIES
RADIOBIOLOGY

AN INDEX TO U.S. NAVAL RADIOLOGICAL DEFENSE
AD-402 736 DIV. 1A

BIBLIOGRAPHIES
THERMAL STRESSES

ANNOTATED BIBLIOGRAPHY OF THERMAL SHOCK: 1950 TO 1960.
AD-403 469 DIV. 2B

BIBLIOGRAPHIES
WELDING

AN ANNOTATED BIBLIOGRAPHY ON COLD WELDING IN VACUUM COVERING THE YEARS 1943 TO 1962.
AD-403 441 DIV. 2B

*BINDERS
SMOKE MUNITIONS

SURVEY OF RECENT INVESTIGATION OF PLASTIC-BONDED AND CASTABLE SMOKE COMPOSITIONS.
AD-403 499 DIV. 3

*BIONICS
SENSORY MECHANISMS

PATTERN-PERCEIVING AND LEARNING NETWORKS: NETWORKS FOR SELECTING PATTERNED INPUTS AND OUTPUTS. COMPUTER MODEL OF SENSORIMOTOR DEVELOPMENT. MATHEMATICAL THEORY OF SENSORIMOTOR ORGANIZATION AND PERCEPTION.
AD-403 494 DIV. 2B

*BLOOD CIRCULATION
MEASUREMENT

CONTINUOUS SIMULTANEOUS REGISTRATION OF SPLATINE AND BLOOD FLOW IN A SMALL SKIN AREA.
AD-402 762 DIV. 16

*BLOOD PLASMA

TRANSLATION OF FOREIGN RESEARCH: SIGNIFICANCE OF PLASMA CELLS IN ANTIBODY FORMATION PROCESS CAUSING EXCITING RADIATION.
AD-402 518 DIV. 14

*BLUNT BODIES
HYPERSONIC CHARACTERISTICS

THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER IN HYPERSONIC FLOW.
AD-403 486 DIV. 9

*BODIES OF REVOLUTION
AXIALLY SYMMETRIC FLOW

EFFECT OF AXIAL POSITION OF PROPELLER ON THE PROPULSION CHARACTERISTICS OF A SUBMERGED BODY OF REVOLUTION.
AD-403 310 DIV. 27

*BODIES OF REVOLUTION
VIBRATION

DISCUSSION OF THEORY OF VIBRATION OF A PARABOLOIDAL SHELL OF REVOLUTION. RESULTS OF EXPERIMENTS ON TWO MODELS OF SUCH SHELLS.
AD-402 926 DIV. 25

*BOILERS
CONTROL SYSTEMS

OPEN LOOP RESPONSE MEASUREMENTS WERE MADE OF THE ELEMENTS COMPRISING THE CLASS MAIN BOILER AND ITS SEVERAL CONTROL LOOPS.
AD-403 077 DIV. 27

*BOILING
EQUATIONS OF STATE

AN ANALYSIS OF CRITERION RELATIONSHIPS FOR BOILING BOILING IN TUBES.
AD-402 728 DIV. 05

*BOMB RACKS
AIRCRAFT FLARES

GROUND TESTS OF MARK 6 MOD 0 FLARE CARRIAGE ON THE D-37A1 BOMB RACK FOR THE F-105 AIRCRAFT.
AD-402 634 DIV. 22

*BORON COMPOUNDS
AROMATIC COMPOUNDS

REACTIONS OF DIALKYLAMINEBORON COMPOUNDS WITH AROMATIC ISOCYANATES AND ISOTHIOCYANATES.
AD-403 376 DIV. 6

*BOUNDARY LAYER CONTROL SYSTEMS
CARTRIDGES (PAD)

EMERGENCY CONTROL OF BOUNDARY LAYER ON AIRCRAFT WINGS BY PROPELLANT ENERGY.
AD-402 610 DIV. 1

*BRAIN
NERVE CELLS

ELECTROPHYSIOLOGICAL, HISTOCHEMICAL, AND CYTOMORPHOLOGICAL INDICES OF BRAIN NEURON EXCITATION. TRANSLATION OF FOREIGN RESEARCH.
AD-402 523 DIV. 16

*BRAIN
STIMULATION

MEDICAL RESEARCH ON THE ROLE OF THALAMIC AND RETICULAR FORMATION UPON THE FREQUENCY RESPONSE ACTIVITIES OF THE GENERATOR OF ELECTROENCEPHALOGRAM AND HYPNOGRAM.
AD-403 118 DIV. 16

*BROMIDES
SYNTHESIS (CHEMISTRY)

PREPARATION OF CARBON-14 LABELED TETRAMETHYLAMMONIUM BROMIDE. CONDENSATION OF C-14 METHYL IODINE WITH TRIMETHYLAMINE. INDEPENDENCE OF YIELD (RANGE OF 1908 THEORY) WITH VARYING AMOUNTS OF TRIMETHYLAMINE.
AD-403 407 DIV. 4

*BUILDINGS
SHELTERS

EFFECT OF INTERIOR PARTITIONS ON RADIATION DOSE RATE IN A MULTISTORY RECTANGULAR BUILDING.
AD-402 685 DIV. 19

*CADMIUM
PLATING

EVALUATION OF CADMIUM PLATING SYSTEMS FOR HYDROGEN EMBRITTLEMENT.
AD-402 983 DIV. 4

*CARBIDES
PHASE STUDIES

RESULTS OF AN INVESTIGATION OF PHASE EQUILIBRIA IN THE BINARY SYSTEMS, ZIRCONIUM-CARBON, TANTALUM-CARBON, AND BORON-CARBON
AD-402 797 DIV. 17

*CARGO SHIPS
COSTS

FIRST ORDER ESTIMATE OF DISPLACEMENT AND COST OF TANKERS AND DRY CARGO SHIPS AS A FUNCTION OF PAYLOAD, SPEED AND RANGE.
AD-403 336 DIV. 31

*CARGO SHIPS
WEIGHT

FIRST ORDER ESTIMATE OF DISPLACEMENT AND COST OF TANKERS AND DRY CARGO SHIPS AS A FUNCTION OF PAYLOAD, SPEED AND RANGE.
AD-403 336 DIV. 31

*CATHODE RAY TUBES
MANUFACTURING METHODS

A REVISION IS PRESENTED OF THE CYL-1-33 DEFLECTION. CERAMIC SUBSTRATE CONES WERE PUT IN PROCESS. A TECHNIQUE WAS STUDIED FOR FASTENING ELECTRODE PINS IN THE CERAMIC CONES. THE VACUUM-METALLIZING TECHNIQUE WAS CONTINUED.
AD-403 324 DIV. 9

*CATHODES (ELECTRON TUBES)
MANUFACTURING METHODS

STUDY OF THE IMPROVEMENT OF THE EFFICIENCY OF THERMIONIC CONVERTERS. MAKING OF NON-PLANAR SURFACE CHARACTERISTICS.
AD-402 697 DIV. 8

*CAVITATION
PROPELLERS (MARINE)

CAVITATION TESTS OF ESCORT RESEARCH VESSEL COUNTERROTATING PROPELLERS IN SIMULATED WAKE.
AD-403 312 DIV. 27

*CAVITY RESONATORS
RESONANCE

LONG-LINE EFFECT IN CONNECTION WITH CAVITY RESONANCES.
AD-403 374 DIV. 25

*CERAMIC CAPACITORS
MANUFACTURING METHODS

RESEARCH ON A SUITABLE DISPERSING OR ANALYZING CRYSTAL FOR X-RAY SPECTROSCOPY.
AD-403 453 DIV. 7

*CERAMIC MATERIALS
MICROSTRUCTURE

MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE REFRACTORY OXIDES.
AD-403 345 DIV. 14

*CETACEA

DEVELOPMENTS IN THE FIELD OF INTERNATIONAL REGULATIONS OF DEEP-SEA FISHING AND WHALING.
AD-402 548 DIV. 32

*CHARGED PARTICLES
IMAGES

LATENT IMAGE FADING IN ILFORD K-0 AND K-2 EMULSIONS OF PHOTOGRAPHIC PLATES.
AD-402 836 DIV. 24

*CHEMICAL ENGINEERING
SHOCK WAVES

THE COLLAPSE OF A SPHERICAL CAVITY IN A COMPRESSURE FLUID.
AD-403 347 DIV. 9

*CHROMOSOMES
X RAYS

EFFECTS OF RADIATIONS ON CELL DIVISION.
AD-403 109 DIV. 16

*CIVIL DEFENSE SYSTEMS
EFFECTIVENESS

CRASH CIVIL DEFENSE PROGRAM STUDY. POPULATION AND RESOURCE DISPERSAL. SHELTER IMPROVEMENT AND IMPROVISATION. PROTECTION OF RESOURCES AGAINST DIRECT WEAPON EFFECTS. INFORMATION DISSEMINATION FOR CRASH CIVIL DEFENSE. CRASH PLANNING.
AD-403 071 DIV. 18

*CLIMATOLOGY
PLANTS (BOTANY)

CHANGES IN THE CLIMATE AND VEGETATION OF THE SOLOMON LESPIT SINCE 1890.
AD-403 012 DIV. 2

*CLOCKS
DIGITAL SYSTEMS

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF FLIGHT DATA MESSAGES.
AD-403 423 DIV. 30

FLOW CHARTS, SYSTEM DIAGRAMS, AND COMPUTER ROUTINE DIAGRAMS FOR COMPUTER PROGRAMMING OF PHASE I LASTEN PROGRAM OF PROJECT NO. 104-402T(FAP). VOL. II-APPENDIXES.
AD-403 495 DIV. 30

*CLOSED-CYCLE ECOLOGICAL SYSTEMS
SPACECRAFT CABINS

THE PLASTICITY OF USING SEVERAL TYPES OF ORGANISMS TO MAINTAIN A GASEOUS BALANCE IN A CLOSED SYSTEM IS DISCUSSED.
AD-402 759 DIV. 16

*CODING
ERRORS

A SPECIFIC METHOD OF PROGRAMMING A DIGITAL COMPUTER TO CONSTRUCT AND EVALUATE CODES SUITABLE FOR USE IN A BURST-ERROR CORRECTION DECODING SCHEME.
AD-402 676 DIV. 8

*COMBINATORIAL ANALYSIS
MATRIX ALGEBRA

ERROR SUM OF SQUARES UNDER COMPLETE AND CONSTRAINED RANDOMIZATION.
AD-402 644 DIV. 15

*COMBUSTION
DATA PROCESSING SYSTEMS

FLAME SPEED DATA REDUCTION AND CORRELATION USING A DIGITAL COMPUTER.
AD-403 498 DIV. 9

*COMBUSTION
JET ENGINES

VIBRATION COMBUSTION IN LIQUID FUELED ROCKET ENGINES.
AD-402 909 DIV. 12

*COMBUSTION
THERMODYNAMICS

PROJECT SQUID SEMI-ANNUAL PROGRESS REPORT ON FLUID MECHANICS, TRANSPORT AND TRANSFER PROCESSES, CHEMICAL KINETICS, AND COMBUSTION PHENOMENA.
AD-402 775 DIV. 10

*COMMAND AND CONTROL SYSTEMS
DESIGN

SOFTWARE (DESIGN AND IMPLEMENTATION). A STUDY OF COMPUTERS IN COMMAND AND CONTROL SYSTEMS.
AD-403 451 DIV. 30

*COMMUNICABLE DISEASES
DISEASE VECTORS

RESEARCH PROJECTS OF THE SEATO MEDICAL LABORATORY. VECTOR-BORNE DISEASES OF THAILAND.
AD-402 923 DIV. 16

*COMMUNICATION EQUIPMENT
ANTENNAS

EFFECTIVENESS OF HF LOGARITHMICALLY PERIODIC ANTENNAS FOR USE BY THE FAA RAD SERVICE.
AD-403 033 DIV. 8

*COMMUNICATION EQUIPMENT
WALKIE-TALKIES

DESIGN OF TWO COMMAND PACKS WHICH PROVIDE A FORWARD GROUND COMMUNICATION STATION TO BE SET UP BY ONE MAN AFTER PARACHUTING.
AD-403 339 DIV. 5

*COMMUNICATION SATELLITES (PASSIVE)
RADAR REFLECTORS

EXPANSION OF INTERIM SIMPLEX SPACE COMMUNICATION FACILITIES AT ROME, N. Y. AND TRINIDAD TO FULL DUPLEX FOR USE IN PASSIVE SATELLITE COMMUNI-
AD-402 834 DIV. 5

*COMMUNICATION SYSTEMS
CIRCUITS

PROBABILISTIC PROPERTIES OF MODULAR CIRCUITS.
AD-403 464 DIV. 8

*COMMUNICATION SYSTEMS
CIVIL DEFENSE SYSTEMS

ORGANIZATION AND PRESENTATION OF ENVIRONMENTAL DATA FOR OFFICE OF CIVIL DEFENSE USE. A FEASIBILITY STUDY.
AD-402 917 DIV. 32

*COMMUNICATION THEORY
SAMPLING

NOTES ON SYSTEM THEORY: DEVELOPMENT AS A BASIC SCIENTIFIC DISCIPLINE.
AD-403 430 DIV. 30

*COMPOSITE MATERIALS
GLASS

INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS. NEW METHODS OF FORMING ALUMINUM COATED GLASS FIBERS. PHYSICAL PROPERTIES OF COMPOSITES. PRODUCTION OF GLASS-REINFORCED ALUMINUM TUBULAR SHAPES. THEORY OF INTERACTION OF METALS AND GLASS FIBERS.
AD-402 693 DIV. 14

INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
AD-402 783 DIV. 14

INVESTIGATION OF GLASS METAL COMPOSITE MATERIALS. THEORETICAL STUDIES.
AD-402 785 DIV. 14

*COMPOSITE MATERIALS
GLASS TEXTILES

PROGRESS REPORT: HIGH TEMPERATURE GLASS FIBER REINFORCED METALS.
AD-403 331 DIV. 14

*COMPOSITE MATERIALS
METALS

INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
AD-402 783 DIV. 14

INVESTIGATION OF GLASS METAL COMPOSITE MATERIALS. THEORETICAL STUDIES.
AD-402 785 DIV. 14

*COMPRESSIBLE FLOW
WATER

THE COLLAPSE OF A SPHERICAL CAVITY IN A COMPRESSIBLE FLUID.
AD-403 347 DIV. 9

*COMPRESSIVE PROPERTIES
SAND

THE ENERGY ABSORPTION CAPACITY OF GRANULAR MATERIALS IN ONE-DIMENSIONAL COMPRESSION. THEORETICAL APPROACH FOR PREDICTING THE STRESS - STRAIN BEHAVIOR OF DENSE SANDS PRIOR TO PARTICLE CRUSHING. EFFECT OF GRAIN CRUSHING ON THE BEHAVIOR OF SANDS.
AD-402 779 DIV. 14

*COMPRESSOR BLADES
STRESSES

CALCULATING RADIAL OVERFLOWS IN A TURBINE STAGE, AND MEASURING PRESSURE PULSATIONS AND DYNAMIC STRESSES ON THE ROTATING VANES OF AN AXIAL COMPRESSOR.
AD-402 591 DIV. 28

*COMPUTER LOGIC
MAGNETIC CORES

A BINARY PARALLEL SUMMATOR WITH THROUGH TRANSFER.
AD-402 599 DIV. 30

*COMPUTERS
DIFFERENTIAL EQUATIONS

CONTINUING RESEARCH ON DEVELOPMENT OF A MORE ACCURATE METHOD FOR CALCULATING BODY-WATER IMPACT PRESSURES.
AD-402 698 DIV. 9

*CONDENSATION
ROCKET MOTOR NOZZLES

FUNDAMENTALS OF THE KINETICS AND MECHANISMS OF CONDENSATION, PARTICULARLY OF HOMOGENEOUS NUCLEATION FROM THE VAPOR PHASE.
AD-403 456 DIV. 27

*CONICAL BODIES
TURBULENT FLOW

DETERMINATION OF STREAMLINES ON A SPHERE-CONE AT ANGLE OF ATTACK FROM THE MEASURED SURFACE PRESSURE DISTRIBUTION.
AD-402 768 DIV. 9

*CONTROL SYSTEMS

TRANSLATIONS OF RUSSIAN ARTICLES A CYBERNETIC AND AUTOMATIC CONTROL.
AD-402 521 DIV. 28

*CONTROL SYSTEMS
BIBLIOGRAPHIES

ABSTRACTS OF PAPERS RECENTLY PRODUCED IN THE CONTROL SYSTEMS RESEARCH STUDIES AT LINCOLN LAB.
AD-403 428 DIV. 30

*CORTICOSTEROID AGENTS
SALIVA

CORTICOSTEROIDS IN HUMAN PAROTID FLUID FOLLOWING ORAL HYDROCORTISONE DOSAGE.
AD-403 380 DIV. 16

*CORUNDUM
SINTERING

A BOOK THAT DISCLOSES THE PROPERTIES AND METHODS OF PREPARING SINTERED CORUNDUM.
AD-402 580 DIV. 17

*COSTS
NUCLEAR WARFARE

THE INVOLVEMENT OF COST IN DECISIONS AND RISK CONCERNING CENTRAL WAR.
AD-402 990 DIV. 32

*CRUISERS
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, TENDERS, AND TUGS.
AD-403 060 DIV. 31

*CRYSTAL GROWTH
ORGANIC COMPOUNDS

RESEARCH ON A SUITABLE DISPERSING OR ANALYZING CRYSTAL FOR X-RAY SPECTROSCOPY.
AD-403 492 DIV. 25

*CRYSTAL GROWTH
RUBY

RUBY IMPROVEMENT FOR LASERS: CRYSTAL GROWTH PROCESSES.
AD-403 133 DIV. 25

*CRYSTAL HOLDERS
GLASS

PILOT PRODUCTION OF GLASS CRYSTAL HOLDERS. GLASS WORKING AND SEALING. GLASS PROPERTIES.
AD-403 446 DIV. 14

*CRYSTAL OSCILLATORS
SATELLITES (ARTIFICIAL)

ELECTRONIC AND THERMAL CONSIDERATIONS OF PRECISION OSCILLATORS FOR USE IN SATELLITES, PARTICULARLY IN THE LINE OF CRYSTAL TEMPERATURE CONTROL.
AD-402 890 DIV. 8

*CRYSTAL OSCILLATORS
TRANSISTORS

ELECTRONIC AND THERMAL CONSIDERATIONS OF PRECISION OSCILLATORS FOR USE IN SATELLITES, PARTICULARLY IN THE LINE OF CRYSTAL TEMPERATURE CONTROL.
AD-402 890 DIV. 8

*CRYSTALS
MIXTURES

REACTIONS IN MIXTURES OF SOLIDS, REACTION MECHANISMS AND THERMODYNAMICS. APPLICATIONS IN CERAMICS, REFRACTORIES AND CEMENTS. TRANSLATION OF RUSSIAN BOOK.

AD-402 799 DIV. 4

*CULICIDAE
INSECTICIDES

ORALLY EFFECTIVE MOSQUITO REPELLENTS: LIPID-WATER AND CHLOROFORM-WATER DISTRIBUTION OF POTENTIAL REPELLENTS; SYNTHESIS OF N,N-DIETHYL-2,4-DIMETHYLBENZAMIDE AND N,N-DIETHYL-M-(N-PROPYL) BENZAMIDE.
AD-402 712 DIV. 16

*CYBERNETICS

TRANSLATIONS OF RUSSIAN ARTICLES A CYBERNETIC AND AUTOMATIC CONTROL.
AD-402 521 DIV. 28

*CYBERNETICS
SYMPOSIA

SIGNIFICANCE OF CYBERNETICS IN SCIENCE, TECHNOLOGY AND ECONOMY IN THE GERMAN DEMOCRATIC REPUBLIC. CONFERENCE OF THE CYBERNETICS COMMISSION HELP BY THE SECRETARY GENERAL OF THE GERMAN ACADEMY OF SCIENCES, OCT 1962. TRANSLATION.
AD-402 520 DIV. 30

*CYCLONES

CYCLONE AND ANTICYCLONE PERIODIC VARIATIONS ON METEOROLOGICAL CHARTS FOR AREA SOUTH OF 50 DEG SOUTH.
AD-403 143 DIV. 2

*CYLINDRICAL BODIES
DRAG

SLENDER, TWO-DIMENSIONAL BODIES HAVING MINIMUM TOTAL DRAG AT HYPERSONIC SPEEDS.
AD-403 460 DIV. 9

*CYLINDRICAL BODIES
PLASTICITY

RESEARCH ON ENERGY ABSORBING STRUCTURES, THEORETICAL AND EXPERIMENTAL STUDIES OF CONVOLUTED TYPE STRUCTURES.
AD-402 854 DIV. 17

*CYLINDRICAL BODIES
STABILITY

DYNAMIC RESPONSE OF CIRCULAR CYLINDRICAL SHELLS SUBJECTED TO TRAVELING LOADS; RESONANCE DUE TO BUCKLING IS SHOWN TO OCCUR AT A MUCH LOWER VELOCITY THAN THAT DUE TO AXIAL MOTION.
AD-403 001 DIV. 25

*DATA PROCESSING SYSTEMS

PROGRAM ON COMPUTER UTILIZATION REPORTS WHICH USE PUNCHED CARDS AS INPUT AND GENERATE TIME UTILIZATION ON ALL COMPUTING EQUIPMENT.
AD-402 903 DIV. 30

HIGH-SPEED DATA PROCESSOR SYSTEM RESEARCH: PROJECT LIGHTNING; SUPPLEMENT TO INTERIM RESEARCH REPORT 154.
AD-403 412 DIV. 30

*DATA PROCESSING SYSTEMS
AIR TRAFFIC CONTROL SYSTEMS

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF FLIGHT DATA MESSAGE.
AD-403 423 DIV. 30

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF MESSAGES. COMPUTER ROUTINES FOR THE SYSTEM ARE PRESENTED.
AD-403 484 DIV. 30

FLOW CHARTS, SYSTEM DIAGRAMS, AND COMPUTER ROUTINE DIAGRAMS FOR COMPUTER PROGRAMMING OF PHASE I MASTER PROGRAM OF PROJECT NO. 104-402T(FAA). VOL. II-APPENDIXES.
AD-403 405 DIV. 30

*DATA PROCESSING SYSTEMS
ANTIAIRCRAFT DEFENSE SYSTEMS

USE OF CHRONICLER AS A REGENERATIVE RECORDING SYSTEM TESTING, AND ANALYSIS CONCEPT FOR SAGE AND OTHER REAL-TIME DIGITAL SYSTEMS.
AD-402 792 DIV. 30

*DATA PROCESSING SYSTEMS
DESIGN

COMPUTER-BASED METHODOLOGY FOR SYSTEM DEVELOPMENT: SITE PRODUCTION AND REDUCTION SYSTEM.
AD-403 384 DIV. 30

*DATA PROCESSING SYSTEMS
DIGITAL COMPUTERS

COMPUTER GENERATION OF ACM ASSOCIATION MAPS FOR MAN-MACHINE COMMUNICATION.

AD-402 647 DIV. 30

PERIODIC PROGRESS REPORT ON PROJECT LIGHTNING HIGH-SPEED DATA PROCESSOR SYSTEM RESEARCH.
AD-403 385 DIV. 30

*DATA PROCESSING SYSTEMS
INFORMATION RETRIEVAL

SUMMARY OF SYMPOSIUM ON THE EFFECTS OF ELECTRONIC DATA PROCESSING IN FUTURE INSTRUCTIONAL SYSTEMS.
AD-402 646 DIV. 30

*DATA PROCESSING SYSTEMS
TEACHING MACHINES

SUMMARY OF SYMPOSIUM ON THE EFFECTS OF ELECTRONIC DATA PROCESSING IN FUTURE INSTRUCTIONAL SYSTEMS.
AD-402 646 DIV. 30

*DATA PROCESSING SYSTEMS
TENTS

EQUIPMENT MODIFICATIONS AND FEASIBILITY DEMONSTRATION FOR IMPROVEMENT OF THE PHASE I UNIVAC AIR DATA PROCESSING SYSTEM.
AD-403 030 DIV. 30

*DATA STORAGE SYSTEMS

CONTROL OF AND AUTOMATIC ALLOCATION FOR LARGE SCALE CYCLIC SYSTEMS.
AD-402 904 DIV. 30

*DATA TRANSMISSION SYSTEMS
AIR TRAFFIC CONTROL SYSTEMS

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF FLIGHT DATA MESSAGE.
AD-403 423 DIV. 30

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF MESSAGES. COMPUTER ROUTINES FOR THE SYSTEM ARE PRESENTED.
AD-403 484 DIV. 30

FLOW CHARTS, SYSTEM DIAGRAMS, AND COMPUTER ROUTINE DIAGRAMS FOR COMPUTER PROGRAMMING OF PHASE I EASTERN PROGRAM OF PROJECT NO. 104-6027(FAA). VOL. II-APPENDIXES.
AD-403 495 DIV. 30

*DECONTAMINATION
BIOLOGICAL WARFARE AGENTS

DESCRIPTION OF DECONTAMINATION PROCESS, CLASS III SYSTEM, BY WHICH ALL TOXINS AND MICRO-ORGANISMS IN THE SYSTEM ARE ELIMINATED FOR HUMAN SAFETY.
AD-402 710 DIV. 3

*DEFORMATION
SOLID ROCKET PROPELLANTS

DEFORMATIONS AND STRESSES IN AXIALLY ACCELERATED CASE-BONDED SOLID PROPELLANT GRAINS OF FINITE LENGTH. DEFORMATION OF VISCOELASTIC CYLINDERS OF INFINITE LENGTH AND ARBITRARY CROSS SECTION UNDER AXIAL ACCELERATION LOADS.
AD-403 443 DIV. 10

*DENTISTRY
CORTICOSTEROID AGENTS

CORTICOSTEROIDS IN HUMAN PAROTID FLUID FOLLOWING ORAL HYDROCORTISONE DOSAGE.
AD-403 380 DIV. 16

*DESOXYRIBONUCLEIC ACIDS
BACTERIOPHAGES

GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
AD-403 108 DIV. 16

*DESOXYRIBONUCLEIC ACIDS
METABOLISM

STUDIES ON DESOXYRIBONUCLEIC ACID METABOLISM.
AD-402 969 DIV. 16

*DESTROYER ESCORTS
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, ICEBREAKERS, AND TUGS.
AD-403 060 DIV. 31

*DESTROYERS
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, ICEBREAKERS, AND TUGS.
AD-403 060 DIV. 31

*DETECTORS
GENERATORS

TECHNIQUE FOR INTERCHANGING GENERATOR AND DETECTOR IN THE IMPEDANCE MEASUREMENT OF MICROWAVE ONE-PORTS; EXTENSION OF TECHNIQUE TO MEASUREMENTS OF RECIPROCAL TWO-PORTS.
AD-403 390 DIV. 8

*DETERMINANTS
EQUATIONS

SEVEN BASIC EQUATIONS ARE DERIVED FOR SMALL-AMPLITUDE PERTURBATIONS IN PARTIALLY-IONIZED GASES.
AD-403 127 DIV. 25

*DIESEL ENGINES
IGNITION

INDEX TO A BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINE LOW TEMPERATURE PROBLEMS.
AD-402 666 DIV. 27

*DIFFUSERS
FINS

RESULTS OF EXPERIMENTAL INVESTIGATION OF THE EFFECT OF VARIOUS GEOMETRIC PARAMETERS ON THE EFFECTIVENESS OF A FINNED DIFFUSER.
AD-402 582 DIV. 9

*DIFFUSION
BERYLLIUM

SOLUBILITY AND DIFFUSION OF GASES IN BERYLLIUM.
AD-403 370 DIV. 17

*DIODES (SEMICONDUCTOR)
GALLIUM COMPOUNDS

DEVELOPMENT OF IMPROVED ELECTRON INJECTION ARSENIDE, INDIUM PHOSPHIDE AND OTHER SEMICONDUCTING COMPOUNDS.
AD-403 130 DIV. 25

GALLIUM ARSENIDE VARACTOR DIODES. SPECIFICATIONS AND PROCESS DEVELOPMENT.
AD-403 291 DIV. 8

*DIODES (SEMICONDUCTOR)
LIMITERS

MEASUREMENTS OF LINEWIDTH AND ANISOTROPY FIELD MADE ON A 600 GRAM HAVING SINGLE-CRYSTAL FERRITE. A LOW-THRESHOLD ULTRADYNAMIC RANGE VARACTOR LIMITER WAS DESIGNED. PERFORMANCE OF C-BAND CIRCULATORS A ONE-PORT PARAMETRIC AMPLIFIER WERE ANALYZED.
AD-403 475 DIV. 8

*DIODES (SEMICONDUCTOR)
VARIABLE CAPACITORS

HIGH Q VARACTOR DIODE DEVELOPMENT.
AD-403 455 DIV. 8

*DIPOLE ANTENNAS
ELECTRICAL IMPEDANCE

INTEGRAL EQUATION SOLUTIONS FOR CIRCULAR PARALLEL DIPOLE ANTENNAS EQUALLY SPACED AROUND THE CIRCUMFERENCE OF A CIRCLE FOR FIRST ORDER IMPEDANCE CALCULATIONS.
AD-403 470 DIV. 8

*DIPTERA
BIBLIOGRAPHIES

INDEXED BIBLIOGRAPHY TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY.
AD-402 704 DIV. 16

*DISPLAY SYSTEMS
ELECTROLUMINESCENCE

INVESTIGATION OF MATERIALS FOR USE IN A SOLID-STATE ELECTROLUMINESCENT DISPLAY DEVICE IN WHICH THE ELECTRIC FIELD FOR ACTIVATION OF THE ELECTROLUMINESCENT IS PROVIDED BY ELASTIC WAVES PROPAGATED THROUGH A PIEZOELECTRIC CERAMIC PLATE.
AD-402 888 DIV. 8

*DOCUMENTATION
CIVIL DEFENSE SYSTEMS

ORGANIZATION AND PRESENTATION OF ENVIRONMENTAL DATA FOR OFFICE OF CIVIL DEFENSE USE. A FEASIBILITY STUDY.
AD-402 917 DIV. 32

*DUCT BENDS

A MONTE CARLO PROCEDURE TO EVALUATE THE ENERGY, ANGULAR DISTRIBUTION, AND INTENSITY OF EITHER THE SCATTERED NEUTRON OR GAMMA RAY FLUX THAT PENETRATES A MULTIBEND DUCT.
AD-402 816 DIV. 25

*ECHO RANGING

OCEANOGRAPHIC VESSEL HEAP CRUISE 280 WHICH INCLUDED ECHO-SOUNDING SURVEY, SCATTERING LAYER OBSERVATIONS, AND SEISMIC REFRACTION STUDIES.
AD-403 141 DIV. 2

*ECONOMICS
COSTS

PRICE BEHAVIOR UNDER ALTERNATIVE FORMS OF PRICE EXPECTATIONS.
AD-403 348 DIV. 32

*ECONOMICS
GAME THEORY

EXAMINATION OF A CLASSICAL FORMULATION AT THE MARKETPLACE FROM THREE DIFFERENT VIEWPOINTS. CONTRAST OF RESULTING SOLUTIONS.
AD-402 950 DIV. 15

*ELECTRIC CABLES
ELECTRIC CONNECTORS

RESEARCH WAS DIRECTED TO MULTIPLE ELEMENT INSULATION PIERCING CONNECTORS FOR ELECTRICAL CABLE CONNECTORS.
AD-403 356 DIV. 7

*ELECTRIC CONNECTORS
ELECTRIC CABLES

RESEARCH WAS DIRECTED TO MULTIPLE ELEMENT INSULATION PIERCING CONNECTORS FOR ELECTRICAL CABLE CONNECTORS.
AD-403 356 DIV. 7

*ELECTRIC DISCHARGES
RADAR PULSES

EFFORTS TO OBTAIN SUPER RANGE RESOLUTION RADAR LEADS TO A STUDY OF MICROWAVE BREAKDOWN AT PULSE WIDTHS BELOW 30 NANOSECONDS.
AD-403 458 DIV. 8

*ELECTRIC POWER PRODUCTION

VIBRATION COMBUSTION IN LIQUID FUELED ROCKET ENGINES.
AD-402 909 DIV. 12

*ELECTRIC POWER PRODUCTION
POWER PLANTS (ESTABLISHMENTS)

SCIENTIFIC AND TECHNICAL INFORMATION ON NORTH VIETNAMS TRANSLATIONS.
AD-402 517 DIV. 7

*ELECTRICAL CONDUCTANCE
IONOSPHERE

DETERMINATION OF IMPEDANCE CHARACTERISTICS OF A CAPACITIVE IONOSPHERIC ROCKET PROBE SHOW THAT THE SHEATH MAKES A SIGNIFICANT CONTRIBUTION TO THE IMPEDANCE CHARACTERISTICS.
AD-403 135 DIV. 30

*ELECTRICAL CONDUCTANCE
MEDIUM FREQUENCY

ROCKET INSTRUMENTATION FOR THE MEASUREMENT OF AC CONDUCTIVITY WITH A CAPACITANCE PROBE, AND LOW WAVE PROPAGATION IN THE LOWER IONOSPHERE.
AD-403 482 DIV. 8

*ELECTRICAL IMPEDANCE
INTEGRAL EQUATIONS

INTEGRAL EQUATION SOLUTIONS FOR CIRCULAR PARALLEL DIPOLE ANTENNAS EQUALLY SPACED AROUND THE CIRCUMFERENCE OF A CIRCLE FOR FIRST ORDER IMPEDANCE CALCULATIONS.
AD-403 470 DIV. 8

*ELECTRICAL IMPEDANCE
MEASUREMENT

TECHNIQUE FOR INTERCHANGING GENERATOR AND DETECTOR IN THE IMPEDANCE MEASUREMENT OF MICROWAVE ONE-PORTS; EXTENSION OF TECHNIQUE TO MEASUREMENTS OF RECIPROCAL TWO-PORTS.
AD-403 390 DIV. 8

*ELECTRICAL NETWORKS
SYNTHESIS

SENSITIVITY CONSIDERATIONS IN SYNTHESIS OF ACTIVE RL NETWORKS USING TRANSISTOR AMPLIFIERS.
AD-403 403 DIV. 8

*ELECTRODES
ADSORPTION

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ADSORBED SUBSTANCES. NICKEL AND PLATINUM ELECTRODES.
AD-403 343 DIV. 6

*ELECTRODES
OSCILLOSCOPES

RESEARCH ON THE RELATION BETWEEN THE ELECTRORETINOGRAM (ERG) AND SINGLE CELL ACTIVITIES IN THE RETINA.
AD-402 961 DIV. 16

*ELECTRODES
SILVER

SILVER-CADMIUM BATTERY PROGRAM. SEPARATOR STUDIES. SILVER ELECTRODE CALCULATION OF ELECTROLYTE VOLUME. PRESSURE DECAY. CHARGING PROBLEMS. ELECTRICAL TESTING. ENVIRONMENTAL TESTING.
AD-402 981 DIV. 9

*ELECTRODES
THERMIONIC CONVERTERS

EXPERIMENTAL PROGRAM ON EMITTER MATERIALS TO DETERMINE THEIR POTENTIAL FOR USE IN LOW-TEMPERATURE THERMIONIC ENERGY CONVERTERS.
AD-403 362 DIV. 8

*ELECTRODES
THERMIONIC EMISSION

DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
AD-402 639 DIV. 7

***ELECTROENCEPHALOGRAPHY**
RECORDING SYSTEMS

MEDICAL RESEARCH ON THE ROLE OF THALAMIC AND RETICULAR FORMATION IMPROVEMENT IN FREQUENCY RESPONSE ACTIVITIES OF THE GENERATION OF ELECTROENCEPHALOGRAM AND MYELOGRAM.
AD-403 118 DIV. 14

***ELECTROLYTIC CAPACITORS**
NIOBIUM

ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY
AD-403 279 DIV. 8

***ELECTROMAGNETIC PULSES**
MEASUREMENT

A BIBLIOGRAPHY ON RISE TIME AND HIGH RANGE OF VERY SHORT ELECTRICAL PULSES.
AD-403 137 DIV. 25

***ELECTROMAGNETIC WAVES**
PROPAGATION

AN EXAMINATION OF GUIDED ELECTROMAGNETIC MODES ALONG A HOMOGENEOUS CIRCULAR COLUMN OF PLASMA EXISTING IN FREE SPACE FOR THE TWO EXTREME CASES OF ZERO AND LARGE AXIAL MAGNETIC FIELD.
AD-402 680 DIV. 25

THE DETERMINANTAL EQUATION FOR A RADIAL TAPE HELIX IS TREATED BY TWO METHODS AND COMPLEX-VALUED SOLUTIONS FOR THE PHASE CONSTANT ARE OBTAINED.
AD-402 776 DIV. 8

EXTENSION OF METHODS NON-LINEAR ELECTROMAGNETIC WAVE PROPAGATION STUDIES TO A MAGNETO-IONIC MEDIUM.
AD-403 136 DIV. 8

***ELECTRON BEAMS**
ELECTRON ACCELERATORS

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES. VOL. I - CORNELL UNIVERSITY.
AD-403 025 DIV. 8

***ELECTRON BEAMS**
MATHEMATICAL ANALYSIS

RESEARCH REPORT ON THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF LINEAR BEAM ELECTRON MICROWAVE TUBES - VOL. 2.
AD-403 006 DIV. 8

***ELECTRON TUBES**
GAS DISCHARGES

POSITIVE-COLUMN STRIATIONS IN GASEOUS CONDUCTORS. PERIODIC PHENOMENA IN LOW DENSITY GASEOUS PLASMAS ARE EXAMINED.
AD-403 436 DIV. 25

***ELECTRON TUBES**
MICROWAVE AMPLIFIERS

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES. VOL. I - CORNELL UNIVERSITY.
AD-403 025 DIV. 8

***ELECTRONIC EQUIPMENT**
RADIATION DAMAGE

TRANSIENT RADIATION EFFECTS ON ELECTRONIC COMPONENTS AND SEMICONDUCTOR DEVICES.
AD-403 117 DIV. 8

***ENERGY**
ABSORPTION

THE ENERGY ABSORPTION CAPACITY OF GRANULAR MATERIALS IN ONE-DIMENSIONAL COMPRESSION. THEORETICAL APPROACH FOR PREDICTING THE STRESS - STRAIN BEHAVIOR OF DENSE SANDS PRIOR TO PARTICLE CRUSHING. EFFECT OF GRAIN CRUSHING ON THE BEHAVIOR OF SANDS.
AD-402 779 DIV. 14

***ENERGY**
KINETIC THEORY

THE KINETIC-ENERGY BUDGET OF THE STRATOSPHERE OVER NORTH AMERICA DURING THE WARMING OF 1957.
AD-403 471 DIV. 2

***ENERGY**
SPECTRA (VISIBLE & ULTRAVIOLET)

EXPERIMENTAL INVESTIGATION OF THE ENERGY SPECTRUM OF ATMOSPHERIC LUMINESCENCE.
AD-403 014 DIV. 9

***ENERGY CONVERSION**
PHOTONS

A JOULE ENERGY CONVERSION TECHNIQUE FOR AEROSPACE USE AS A RADIOISOTOPE POWERED ELECTRICAL OUTPUT POWER SOURCE.
AD-402 693 DIV. 20

***EPITAXIAL GROWTH**
ARSENIDES

GALLIUM ARSENIDE EPITAXIAL FILM GROWTH.
AD-402 677 DIV. 8

***EXCITATION**
ENERGY

RESEARCH ON APPLICATION OF NUCLEAR SHELL MODELS TO CALCULATION OF ENERGIES OF GROUND STATES AND EXCITED STATES OF NUCLEI.
AD-403 038 DIV. 20

***EXPLODING WIRES**
UNDERWATER EXPLOSIONS

LOW-YIELD UNDERWATER EXPLOSION TANK AND ASSOCIATED INSTRUMENTATION.
AD-403 032 DIV. 22

***EXPLOSION EFFECTS**
UNDERGROUND STRUCTURES

A DESCRIPTION OF NUCLEAR WEAPON EFFECTS IN THE CLOSE-IN REGION TO PROVIDE THE DESIGNER OF PROTECTIVE CONSTRUCTION USEFUL INPUTS FOR STRUCTURAL ANALYSIS AND DESIGN.
AD-403 028 DIV. 20

APPENDICES TO FINAL REPORT ON UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION.
AD-403 073 DIV. 20

AIR-INDUCED EFFECTS AND DIRECTLY-TRANSMITTED EFFECTS OF NUCLEAR WEAPON SURFACE BURST ON UNDERGROUND STRUCTURES.
AD-403 123 DIV. 22

***EXPLOSIONS**
TNT

HIGH SPEED PHOTOGRAPHIC MEASUREMENTS OF A TEN-TON TNT EXPLOSION.
AD-402 811 DIV. 22

***EXPLOSIVES INITIATORS**
CERAMIC MATERIALS

DEVELOPMENT OF CERAMIC SLURRIES WHICH ARE IMMUNE TO STRAY RADIOFREQUENCY ENERGY.
AD-402 715 DIV. 22

***EXTERIOR BALLISTICS**
CURVE FITTING

PARAMETRIC DESIGN CURVES FOR SHORT-RANGE, HIGH-ACCELERATION BALLISTIC ROCKETS.
AD-403 311 DIV. 27

***EXTERIOR BALLISTICS**
ROCKETS

PARAMETRIC DESIGN CURVES FOR SHORT-RANGE, HIGH-ACCELERATION BALLISTIC ROCKETS.
AD-403 311 DIV. 27

***EXTRATERRESTRIAL RADIO WAVES**
PLANETS

MILLIMETER (8.35 MM) RADIO EMISSION FROM JUPITER AND VENUS.
AD-403 478 DIV. 4

***EXTRUSION**
STEEL

DEVELOPMENT OF AN IMPROVED EXTRUSION PROCESS FOR PRODUCING ULTRA-THIN AIRFRAME - QUALITY STEEL EXTRUSIONS: INTERIM REPORT.
AD-403 357 DIV. 26

***FILMS**
EPITAXIAL GROWTH

GALLIUM ARSENIDE EPITAXIAL FILM GROWTH.
AD-402 677 DIV. 8

***FILMS**
METEOROLOGICAL BALLOONS

PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
AD-402 700 DIV. 1

***FIRE EXTINGUISHERS**
MAINTENANCE

A VACUUM PNEUMATIC PROCESS FOR FILLING LARGE DRY CHEMICAL FIRE EXTINGUISHERS.
AD-402 938 DIV. 29

***FIRING ERROR INDICATORS**
ANTITANK GUNS

METHOD FOR COMPUTING THE FIRST ROUND HIT PROBABILITY FOR AN ANTITANK WEAPON WITH SPOTTING RIFLE CONTROL.
AD-402 808 DIV. 22

***FISHES**
SPINAL COLUMN

MERISTIC CHARACTERS OF FISHES GIVE ACCOUNT OF THE THERMAL HISTORY DURING EARLY DEVELOPMENT.
AD-402 754 DIV. 16

***FIXED RESISTORS**
MICROMINIATURIZATION (ELECTRONICS)

DEVELOPMENT ON A POROUS SUBSTRATE, METALLIZED RESISTOR FOR MICROMINIATURE APPLICATIONS.
AD-402 656 DIV. 7

***FLAME PROPAGATION**
COMBUSTION

FIVE PAPERS SELECTED FROM STABILIZATION OF A FLAME AND THE DEVELOPMENT OF THE COMBUSTION PROCESS IN TURBULENT FLOW.
AD-402 800 DIV. 10

***FLAME PROPAGATION**
TURBULENCE

FIVE PAPERS SELECTED FROM STABILIZATION OF A FLAME AND THE DEVELOPMENT OF THE COMBUSTION PROCESS IN TURBULENT FLOW.
AD-402 800 DIV. 10

***FLAMES**
VELOCITY

FLAME SPEED DATA REDUCTION AND CORRELATION USING A DIGITAL COMPUTER.
AD-403 498 DIV. 9

***FLAT PLATE MODELS**
HYPERSONIC CHARACTERISTICS

EXPERIMENTAL INVESTIGATION OF THE SURFACE PRESSURE AND LAMINAR BOUNDARY LAYER ON A BLUNT FLAT PLATE IN HYPERSONIC FLOW.
AD-403 351 DIV. 9

***FLIGHT**

ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT.
AD-402 808 DIV. 1

***FLIGHT CONTROL SYSTEMS**
DESIGN

PROCEEDINGS OF THE OPTIMUM SYSTEM SYNTHESIS CONFERENCE ON FLIGHT CONTROL SYSTEMS FOR LAUNCH VEHICLES AND AEROSPACE CRAFT.
AD-402 933 DIV. 12

***FLIGHT CONTROL SYSTEMS**
SYMPOSIA

PROCEEDINGS OF THE OPTIMUM SYSTEM SYNTHESIS CONFERENCE ON FLIGHT CONTROL SYSTEMS FOR LAUNCH VEHICLES AND AEROSPACE CRAFT.
AD-402 933 DIV. 12

***FLIGHT SIMULATORS**
HELICOPTERS

DEVELOPMENT OF A FILTER NETWORK TO OPERATE BETWEEN THE AIRFRAME COMPUTER AND THE SERVO SYSTEM OF A DYNAMIC SIMULATOR PLATFORM FOR HELICOPTER TESTING TO SIMULATE UNLIMITED VARIATIONS ON THE LIMITED MOTIONS OF THE DYNAMIC PLATFORM.
AD-403 375 DIV. 8

***FLUID FLOW**
BODIES OF REVOLUTION

ON SLENDER BODIES OF MINIMUM DRAG IN HEATONIAN FLOW.
AD-403 016 DIV. 9

***FLUID MECHANICS**
HYPERSONIC CHARACTERISTICS

REPORT COVERING THE AREAS OF HEAT TRANSFER, FLUID MECHANICS, AND ARC TUNNEL FACILITIES.
AD-402 998 DIV. 9

***FLUID MECHANICS**
THERMODYNAMICS

PROJECT SQUID SEMI-ANNUAL PROGRESS REPORT ON FLUID MECHANICS, TRANSPORT AND TRANSFER PROCESSES, CHEMICAL KINETICS, AND COMBUSTION PHENOMENA.
AD-402 775 DIV. 10

***FLUORIDES**
OXYGEN COMPOUNDS

CHEMICAL REACTIONS OF OXYGEN FLUORIDES: SYNTHESIS OF XENON TETRAFLUORIDE BY ELECTRIC DISCHARGE; SYNTHESIS OF XENON OXYFLUORIDES AND KRYPTON TETRAFLUORIDE.
AD-403 447 DIV. 4

*FRICTION
HIGH TEMPERATURE RESEARCH

FRICTION AND WEAR OF METALS AT ELEVATED TEMPERATURES.
AD-603 419 DIV. 17

*FRIGATES
BOILERS

OPEN LOOP RESPONSE MEASUREMENTS WERE MADE OF THE ELEMENTS COMPRISING THE D1G-6 CLASS MAIN BOILER AND ITS SEVERAL CONTROL LOOPS.
AD-603 077 DIV. 27

*FRIGATES
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, ICEBREAKERS, AND TUGS.
AD-603 060 DIV. 31

*FUNCTIONAL ANALYSIS
SEQUENCES

REPRESENTATIVE FORMULAS FOR THE STUDY OF FUNCTIONAL SPACES.
AD-603 490 DIV. 15

*FUNCTIONS

FILTERS (ELECTROMAGNETIC WAVES).
AD-602 778 DIV. 14

*GAME THEORY

EXAMINATION OF A CLASSICAL FORMULATION AT THE MARKETPLACE FROM THREE DIFFERENT VIEWPOINTS. CONTRAST OF RESULTING SOLUTIONS.
AD-602 980 DIV. 15

*GAME THEORY
SEQUENCES

A 2-PLAYER N-REGION SEARCH GAME.
AD-602 914 DIV. 18

*GAMMA RAYS

MEASUREMENT OF RADIOACTIVITY IN ATMOSPHERE BY MEANS OF BALLOON EQUIPMENT.
AD-603 276 DIV. 20

*GAMMA RAYS
INTENSITY

A MONTE CARLO PROCEDURE TO EVALUATE THE ENERGY, ANGULAR DISTRIBUTION AND INTENSITY OF EITHER THE SCATTERED NEUTRON OR GAMMA RAY FLUX THAT PENETRATES A MULTIBEND DUCT.
AD-602 618 DIV. 25

*GAS BEARINGS
ELECTRIC MOTORS

DEVELOPMENT OF GAS LUBRICATED JOURNAL AND THRUST BEARINGS FOR FLOREN MOTORS.
AD-602 686 DIV. 20

*GAS BEARINGS
STABILITY

STEADY-STATE CHARACTERISTICS OF GAS-LUBRICATED SELF-ACTING, PARTIAL-ARC, JOURNAL BEARINGS OF FINITE WIDTH.
AD-602 801 DIV. 20

SOLUTION OF THE STABILITY PROBLEM FOR 360-DEGREE, SELF-ACTING, GAS-LUBRICATED BEARINGS OF INFINITE LENGTH.
AD-603 063 DIV. 20

*GAS FLOW
JETS

A HYPOTHESIS ON THE UNIVERSALITY OF EJECTION PROPERTIES OF TURBULENT GAS JETS AND ITS APPLICATION TO MIXING TURBULENT JETS OF DIFFERENT DENSITY.
AD-602 561 DIV. 9

*GAS FLOW
LAMINAR BOUNDARY LAYER

DISCUSSION OF METHOD FOR CALCULATING LAMINARY TRANSIENT AND TURBULENT ZONES OF THERMAL BOUNDARY AROUND A SURFACE; TRANSLATION OF RUSSIAN ARTICLE.
AD-602 588 DIV. 9

*GAS FLOW
PRESSURE

AN ANALYSIS OF INITIAL STATIC PRESSURE PROBE MEASUREMENTS IN A LOW-DENSITY HYPERVELOCITY WIND TUNNEL.
AD-602 935 DIV. 9

*GAS FLOW
TURBULENT BOUNDARY LAYER

DISCUSSION OF METHOD FOR CALCULATING LAMINARY TRANSIENT AND TURBULENT ZONES OF THERMAL BOUNDARY AROUND A SURFACE; TRANSLATION OF RUSSIAN ARTICLE.
AD-602 588 DIV. 9

*GAS IONIZATION
ELECTRODES

EXPERIMENTAL STUDY OF ELECTRIC BREAKDOWN WITH A VOLTAGE APPLIED BETWEEN ELECTRODES IMMERSED IN A PLASMA IN GAS OF LOW DENSITY.
AD-602 896 DIV. 25

*GAS IONIZATION
SIMULTANEOUS EQUATIONS

SEVEN BASIC EQUATIONS ARE DERIVED FOR SMALL-AMPLITUDE PERTURBATIONS IN PARTIALLY-IONIZED GASES.
AD-603 127 DIV. 25

*GAS LEAKS
DETECTION

DETECTION AND REPAIR OF GAS LEAKS IN SPACECRAFT CABIN.
AD-603 462 DIV. 12

*GAS LEAKS
SPACECRAFT CABINS

DETECTION AND REPAIR OF GAS LEAKS IN SPACECRAFT CABIN.
AD-603 462 DIV. 12

*GAS TURBINE BLADES
AIR COOLED

THE DESIGN OF A GAS TURBINE BLADE, WHOSE PROFILED "SKIN" SURFACE SURROUNDS BUT IS NOT RIGIDLY SECURED TO A CENTRAL SUPPORTING STEM WHICH IS INTEGRAL WITH THE BLADE ROOT.
AD-602 745 DIV. 27

*GAS TURBINES
DESIGN

CALCULATING RADIAL OVERFLOWS IN A TURBINE STAGE AND MEASURING PRESSURE PULSATIONS AND DYNAMIC STRESSES ON THE ROTATING VANES OF AN AXIAL COMPRESSOR.
AD-602 591 DIV. 28

*GASES
ADSORPTION

STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
AD-602 932 DIV. 25

*GASES
THERMODYNAMICS

TRANSLATIONS OF RUSSIAN ARTICLES ON THERMODYNAMIC PROPERTIES AND LEAKAGE OF GASES.
AD-602 598 DIV. 9

*GENERATORS
DETECTORS

TECHNIQUE FOR INTERCHANGING GENERATOR AND DETECTOR IN THE IMPEDANCE MEASUREMENT OF MICROWAVE COMPONENTS; EXTENSION OF TECHNIQUE TO MEASUREMENTS OF RECIPROCAL TWO-PORTS.
AD-603 390 DIV. 8

*GERMANIUM
FRACTURE (MECHANICS)

THE ANALYSIS OF FRACTURES OF GERMANIUM AND ALUMINUM SINGLE CRYSTALS AND POLYCRYSTALS.
AD-602 972 DIV. 17

*GLASS TEXTILES
METAL COATINGS

INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS. NEW METHODS OF FORMING ALUMINUM COATED GLASS FIBERS. PHYSICAL PROPERTIES OF COMPOSITES. PRODUCTION OF GLASS-REINFORCED ALUMINUM TUBULAR SHAPES. THEORY OF INTERACTION OF METALS AND GLASS FIBERS.
AD-602 693 DIV. 14

*GLASS TEXTILES
REINFORCING MATERIALS

PROGRESS REPORT: HIGH TEMPERATURE GLASS FIBER REINFORCED METALS.
AD-603 331 DIV. 14

*GLASS TEXTILES
TENSILE PROPERTIES

EXPLORATION AND EVALUATION OF NEW GLASSES IN FIBER FORM. EXAMINATION OF THE LENGTH EFFECT ON STRENGTH PROPERTIES OF GLASS FIBERS.
AD-602 714 DIV. 14

*GRAPHITED MATERIALS
COMBUSTION

ANALYSIS OF THE EFFECT OF HETEROGENEOUS REACTION KINETICS ON THE COMBUSTION OF GRAPHITE AT THE STAGNATION REGION OF A BLUNT BODY IN HYPERSONIC FLOW.
AD-603 004 DIV. 9

*GROUND EFFECT MACHINES
AMPHIBIOUS OPERATIONS

A STUDY OF THE OPERATIONAL FEASIBILITY OF THE GROUND EFFECT MACHINE IN THE AMPHIBIOUS SUPPORT MISSION.
AD-602 678 DIV. 31

FEASIBILITY FOR EMPLOYMENT OF GROUND EFFECTS MACHINES IN AMPHIBIOUS OPERATIONS.
AD-602 772 DIV. 18

*GROUP DYNAMICS
WOMEN

HOMOSTATIC THEORY OF SMALL GROUPS: A LONGITUDINAL STUDY OF SIX GROUPS OF FEMALES.
AD-602 892 DIV. 26

*GROUPS (MATHEMATICS)
ANALYSIS

SPACE GROUP TRANSFORMATIONS.
AD-602 985 DIV. 15

*GUERRILLA WARFARE
COMMUNICATION EQUIPMENT

DESIGN OF TWO COMMAND PACKS WHICH PROVIDE A FORWARD GROUND COMMUNICATION STATION TO BE SET UP BY ONE MAN AFTER PARACHUTING.
AD-603 339 DIV. 5

*GUIDED MISSILE COMPONENTS
MATERIALS

GOVERNMENT FURNISHED STANDARD EQUIPMENT FOR PLUTONIAN.
AD-603 285 DIV. 12

*GUIDED MISSILE DETECTION
RADIATION MEASUREMENT SYSTEMS

A SURVEY OF R-F RADIATION FROM ROCKET PLUMES AND RELATED SUBJECTS.
AD-336 049 DIV. 6

*GUIDED MISSILE PERSONNEL
GUIDED MISSILE SAFETY

HUMAN FACTORS IN GUIDED MISSILE SYSTEM SAFETY: INFORMATION CONCERNING INCIDENTS AND PROBLEMS AFFECTING THE OPERATIONAL SAFETY OF ROCKET ENGINE SYSTEMS.
AD-603 115 DIV. 12

*GUIDED MISSILE RANGES
INSTRUMENTATION

A SURVEY OF R-F RADIATION FROM ROCKET PLUMES AND RELATED SUBJECTS.
AD-336 049 DIV. 6

*GUIDED MISSILE RANGES
OPERATION

USE OF A DIGITAL COMPUTER AS AN AID IN SCHEDULING OPERATIONS AT THE PACIFIC MISSILE RANGE.
AD-602 612 DIV. 12

*GUIDED MISSILE SAFETY
HUMAN ENGINEERING

HUMAN FACTORS IN GUIDED MISSILE SYSTEM SAFETY: INFORMATION CONCERNING INCIDENTS AND PROBLEMS AFFECTING THE OPERATIONAL SAFETY OF ROCKET ENGINE SYSTEMS.
AD-603 115 DIV. 12

*GUIDED MISSILE WARHEADS
DESIGN

A DISCUSSION ON THE ENGINEERING, FABRICATION, ASSEMBLY AND TESTING OF THE XW 138 TRAINING WARHEAD.
AD-603 134 DIV. 12

*GUIDED MISSILE WARHEADS
TRAINING DEVICES

A DISCUSSION ON THE ENGINEERING, FABRICATION, ASSEMBLY AND TESTING OF THE XW 138 TRAINING WARHEAD.
AD-603 134 DIV. 12

*GUIDED MISSILES(SURFACE-TO-SURFACE)
DETECTION

A SURVEY OF R-F RADIATION FROM ROCKET PLUMES AND RELATED SUBJECTS.
AD-336 049 DIV. 6

***GUIDED MISSILES(SURFACE-TO-SURFACE)**
MAINTENANCE EQUIPMENT

GOVERNMENT FURNISHED STANDARD EQUIPMENT AND MATERIALS - AS 139.
AD-403 057 DIV. 12

***GYROSCOPES**
MAGNETIC FIELDS

DEVELOPMENT OF A MAGNETIC INDUCTION GYROSCOPE WAS COMPLETED AND EXPERIMENTATION WITH NUCLEAR RESONANCE USING SIMULATED ROTATION CONTINUED.
AD-402 691 DIV. 27

***GYROSCOPES**
RELIABILITY

TRANSLATION OF RUSSIAN ARTICLE ON THE QUALITY OF FILLING FLOATING GYROSCOPES WITH A SPECIAL FLUID.
AD-402 401 DIV. 31

***HALOCARBON PLASTICS**
MICROANALYSIS

PLATINUM PYROLYSIS-TUBE METHOD OF DETERMINING OXYGEN IN FLUORINE CONTAINING COMPOUNDS: TEFLON, AND PERFLUOROURETHYL ETHER.
AD-403 399 DIV. 4

***HALOCARBON PLASTICS**
SYNTHESIS (CHEMISTRY)

SYNTHESIS OF HALOGENATED POLYURETHANE RESINS FOR STRUCTURAL LAMINATES INCREASING THERMAL STABILITY BY HALOGENATION; FLEXURAL STRENGTH AND ELASTICITY; POT-LIFE.
AD-402 709 DIV. 14

***HANDBOOKS**
GAS BEARINGS

DEVELOPMENT OF GAS LUBRICATED JOURNAL AND THRUST BEARINGS FOR ROTOR MOTORS.
AD-402 686 DIV. 20

***HAZARDS**
RADIOFREQUENCY

DEVELOPMENT OF CERAMIC SQUIBS WHICH ARE IMMUNE TO STRAY RADIOFREQUENCY ENERGY.
AD-402 715 DIV. 22

***HEALTH PHYSICS**
BIBLIOGRAPHIES

AN INDEX TO U.S. NAVAL RADIOLOGICAL DEFENSE
AD-402 736 DIV. 16

***HEARING**
TESTS

THE N. U. AUDITORY TEST NUMBER 6: A TEST FOR SPEECH DISCRIMINATION COMPOSED OF CNC MONOSYLLABIC WORDS.
AD-403 275 DIV. 16

***HEART**

TRANSLATION OF FOREIGN RESEARCH: RADIATION INJURY MECHANISM IN MOUSE OVARIES; ELECTRICAL STIMULATION OF THE HEART BY RADIOFREQUENCY IMPULSE TRANSMISSION.
AD-402 519 DIV. 16

***HEAT ENGINES**
SOLAR RADIATION

A 3-KW STIRLING CYCLE SOLAR ENGINE: SECOND QUARTERLY PROGRESS REPORT.
AD-402 737 DIV. 7

A 3-KW STIRLING CYCLE SOLAR ENGINE: MONTHLY PROGRESS REPORT FOR SEPTEMBER 1961.
AD-402 738 DIV. 27

***HEAT RESISTANT METALS & ALLOYS**
PHASE STUDIES

REFRACTORY METAL PHASE DIAGRAMS.
AD-402 630 DIV. 17

***HEAT TOLERANCE**
MEASUREMENT

MEASUREMENT OF PERFORMANCE CHANGES IN HIGHLY TRANSIENT EXTREME HEAT STRESS: RATIONALE, PROBLEMS AND EXPERIMENTAL PROCEDURES.
AD-402 913 DIV. 16

***HEAT TRANSFER**
BOILING

AN ANALYSIS OF CRITERION RELATIONSHIPS FOR LIQUIDS BOILING IN TUBES.
AD-402 728 DIV. 25

***HEAT TRANSFER**
FLUID MECHANICS

REPORT COVERING THE AREAS OF HEAT TRANSFER, FLUID MECHANICS, AND ARC TUNNEL FACILITIES.
AD-402 998 DIV. 9

***HEAT TRANSFER**
JOULE-THOMPSON EFFECT

HEAT TRANSMISSION AND SUPERSONIC FLOW: TRANSLATIONS OF ARTICLES IN RUSSIAN JOURNALS.
AD-402 596 DIV. 9

***HELICOPTERS**
MOTION

A STUDY OF PILOTS AND POTENTIAL HELICOPTER PILOTS TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED.
AD-403 401 DIV. 16

***HELICOPTERS**
TEST EQUIPMENT

DEVELOPMENT OF A FILTER NETWORK TO OPERATE BETWEEN THE AIRFRAME COMPUTER AND THE SERVO SYSTEM OF A DYNAMIC SIMULATOR PLATFORM FOR HELICOPTER TESTING TO SIMULATE UNLIMITED VARIATIONS OF THE LIMITED MOTIONS OF THE DYNAMIC PLATFORM.
AD-403 393 DIV. 8

***HELIXES**
ELECTROMAGNETIC WAVES

THE DETERMINANTAL EQUATION FOR A NARROW TAPE HELIX IS DERIVED BY TWO METHODS, AND COMPLEX-VALUED SOLUTIONS FOR THE PHASE CONSTANT ARE OBTAINED.
AD-402 776 DIV. 8

***HEMISPHERICAL SHELLS**
TURBULENT FLOW

DETERMINATION OF STREAMLINES ON A SPHERE-CONE AT ANGLE OF ATTACK FROM THE MEASURED SURFACE PRESSURE DISTRIBUTION.
AD-402 768 DIV. 9

***HIGH SPEED PHOTOGRAPHY**
EXPLOSIONS

HIGH SPEED PHOTOGRAPHIC MEASUREMENTS OF A 100-TON TNT EXPLOSION.
AD-402 811 DIV. 22

***HOISTS**
TOWERS

AN ERECTING, TOWER-TYPE CRANE WITH A LIFTING CAPACITY OF 75 TONS.
AD-402 592 DIV. 13

***HUMAN ENGINEERING**
WEAPON SYSTEMS

HUMAN ENGINEERING PLAN FOR AS-1338.
AD-402 672 DIV. 28

HUMAN FACTORS IN GUIDED MISSILE SYSTEM SAFETY: INFORMATION CONCERNING INCIDENTS AND PROBLEMS AFFECTING THE OPERATIONAL SAFETY OF ROCKET ENGINE SYSTEMS.
AD-403 115 DIV. 12

***HYDRAULIC FLUIDS**
CONTAMINATION

FLUID CONTAMINATION OF 143 NAVAL AIRCRAFT HYDRAULIC SYSTEMS.
AD-402 711 DIV. 1

***HYDRAULIC FLUIDS**
METALORGANIC COMPOUNDS

IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS. REACTION PRODUCT BETWEEN TETRAISOPROPYLTITANATE AND BASIC ZINC OCTOATE.
AD-403 355 DIV. 14

***HYDRAULIC FLUIDS**
TITANIUM COMPOUNDS

DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
AD-402 739 DIV. 14

***HYDRAULIC SYSTEMS**
CONTAMINATION

FLUID CONTAMINATION OF 143 NAVAL AIRCRAFT HYDRAULIC SYSTEMS.
AD-402 711 DIV. 1

***HYDRIDES**
HEAT OF FORMATION

HEAT OF FORMATION OF LITHIUM ALUMINUM HYDRIDE FROM HEATS OF SOLUTION OF ALUMINUM, LITHIUM, AND LITHIUM ALUMINUM HYDRIDE.
AD-403 346 DIV. 4

***HYDROFOIL BOATS**
CARGO SHIPS

A STUDY OF THE OPERATIONAL FEASIBILITY OF THE GROUND EFFECT MACHINE IN THE AMPHIBIOUS SUPPORT MISSION.
AD-402 678 DIV. 31

***HYDROGEN**
PRODUCTION

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ADSORBED SUBSTANCES, NICKEL AND PLATINUM ELECTRODES.
AD-403 343 DIV. 4

***HYDROGEN**
SOLIDIFIED GASES

TECHNIQUE FOR SOLIDIFYING HYDROGEN AND NEON; PROTOTYPE MODEL PRESSURE-CONTROL VALVE.
AD-403 445 DIV. 15

***HYDROGEN EMBRITTLEMENT**
PLATING

EVALUATION OF CADMIUM PLATING SYSTEMS FOR HYDROGEN EMBRITTLEMENT.
AD-402 983 DIV. 4

***HYPERSONIC FLOW**
BLUNT BODIES

ANALYSIS OF THE EFFECT OF HETEROGENEOUS REACTION KINETICS ON THE COMBUSTION OF GRAPHITE AT THE STAGNATION REGION OF A BLUNT BODY IN HYPERSONIC FLOW.
AD-403 004 DIV. 9

***HYPERSONIC WIND TUNNELS**
DESIGN

MECHANICAL DESIGN OF A 50 In. MACH 10-12 WIND TUNNEL.
AD-402 781 DIV. 30

***HYPERSONIC WIND TUNNELS**
INSTRUMENTATION

HYPERSONIC TEST STAND MODEL INSTRUMENTATION SYSTEM.
AD-402 918 DIV. 30

***HYPERSONIC WIND TUNNELS**
SCIENTIFIC RESEARCH

HYPERSONIC WIND TUNNEL STUDIES: COMPILATION OF TECHNICAL PAPERS.
AD-403 107 DIV. 30

***HYPERSONIC WIND TUNNELS**
SHOCK WAVES

STATUS REPORT ON THE AEROSPACE HYPERSONIC SHOCK TUNNEL.
AD-403 052 DIV. 30

***ICE**
OCEANS

THE DETERIORATION, ABLATION, AND SOME PHYSICAL CHARACTERISTICS OF NATURAL AND CONSTRUCTED SEA ICE.
AD-402 839 DIV. 2

***ICEBREAKERS**
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, ICEBREAKERS, AND TUGS.
AD-403 060 DIV. 31

***IMAGES**
ATTENUATION

LATENT IMAGE FADING IN ILFORD K.0 AND K.2 EMULSIONS ON PHOTOGRAPHIC PLATES.
AD-402 836 DIV. 24

***IMMUNOLOGY**

TRANSLATION OF FOREIGN RESEARCH: SIGNIFICANCE OF PLASMA CELLS IN ANTIBODY FORMATION PROCESS DURING IONIZING RADIATION.
AD-402 518 DIV. 16

***INDUSTRIAL MEDICINE**
SCIENTIFIC RESEARCH

SCIENTIFIC AND TECHNICAL INFORMATION ON NORTH VIETNAM: TRANSLATIONS.
AD-402 517 DIV. 7

***INELASTIC SCATTERING**
NEUTRONS

A STOCHASTIC PROCESS METHOD (SPM) FOR NEUTRON PROBLEMS AND A COMPUTER PROGRAM FOR THE METHOD.
AD-403 485 DIV. 20

*INFECTIONS
IMMUNOLOGY

IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS. CHEMOTHERAPY OF PARAGONIMIASIS WITH BITHIONOL.
AD-403 110 DIV. 1A

*INFECTIONS
INTESTINE

FAR EAST RESEARCH ON THE STUDY OF THE PATHOGENESIS OF INTESTINAL INFECTIONS. OUTBREAK OF CHOLERA, BACILLARY DYSENTERY, AND INFECTION DUE TO SALMONELLA THOMPSON. CLASSIFICATION OF INTESTINAL PATHOLOGENIC ORGANISMS.
AD-403 119 DIV. 1A

*INFORMATION RETRIEVAL

AN ELECTRONIC DIGITAL MACHINE FOR AUTOMATING THE PROCESSES OF STORAGE, SEARCH, AND LOGICAL PROCESSING OF LARGE VOLUMES OF INFORMATION.
AD-402 397 DIV. 32

COMPUTER GENERATION OF BORO ASSOCIATION MAPS FOR MAN-MACHINE COMMUNICATION.
AD-402 647 DIV. 30

*INFRARED DETECTORS
NON-DESTRUCTIVE TESTING

INFRARED TECHNIQUES FOR NON-DESTRUCTIVE TESTING OF SOLID PROPELLANT ROCKET MOTOR BONDING CHARACTERISTICS.
AD-402 888 DIV. 30

*INFRARED SPECTROPHOTOMETERS

A TWO-CHANNEL, ROCKET-BORNE, EBERT GRATING INFRARED AND ULTRAVIOLET SPECTROMETER: DESIGN HISTORY AND THEORY OF OPERATION.
AD-402 611 DIV. 30

*INSECT REPELLANTS
CHEMICAL COMPOUNDS

ORALLY EFFECTIVE MOSQUITO REPELLENTS: LIPID-WATER AND CHLOROFORM-WATER DISTRIBUTION OF POTENTIAL REPELLENTS: SYNTHESIS OF N,N-DIETHYL-2,6-DIMETHYLBENZAMIDE AND N,N-DIETHYL-M-(N-PROPYL) BENZAMIDE.
AD-402 712 DIV. 1A

*INSTRUMENT LANDINGS
VISIBILITY

STUDIES IN THE FIELD OF APPROACH VISIBILITY MEASUREMENT AND INSTRUMENTATION.
AD-403 075 DIV. 33

*INSTRUMENT PANELS
DISPLAY SYSTEMS

DESIGN OF ENGINE PERFORMANCE INDICATOR FOR INTEGRATED DISPLAY SYSTEM FOR JET FIGHTERS.
AD-402 813 DIV. 1

*INSTRUMENTATION

ARTICLES FROM MECHANIK, VOL. 35, NO. 12, PARIS, DECEMBER 1962, ON PRECISION MEASURING INSTRUMENTS AND UNIVERSAL CLAMPING DEVICES.
AD-403 286 DIV. 30

*INSTRUMENTATION
SOUNDING ROCKETS

ROCKET INSTRUMENTATION FOR THE MEASUREMENT OF AC CONDUCTIVITY, WITH A CAPACITANCE PROBE, AND LOW WAVE PROPAGATION IN THE LOWER IONOSPHERE.
AD-403 462 DIV. 8

*INTEGRAL TRANSFORMS

CONVOLUTION INTEGRAL EQUATIONS IN THE FORM OF A LAPLACE TRANSFORM SOLVED BY TRANSFORM INVERSION.
AD-403 426 DIV. 15

*INTERFEROMETERS
DESTROYER ESCORTS

DESIGN OF A ROCKET-BORNE INFRARED SPECTROMETER.
AD-402 605 DIV. 25

*INTERNAL COMBUSTION ENGINES
IGNITION

INDEX TO A BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINE LOW TEMPERATURE PROBLEMS.
AD-402 686 DIV. 27

*INTESTINE
INFECTIONS

FAR EAST RESEARCH ON THE STUDY OF THE PATHOGENESIS OF INTESTINAL INFECTIONS. OUTBREAK OF CHOLERA, BACILLARY DYSENTERY, AND INFECTION DUE TO SALMONELLA THOMPSON. CLASSIFICATION OF INTESTINAL PATHOLOGENIC ORGANISMS.
AD-403 119 DIV. 1A

*INTESTINE
PATHOLOGY

FAR EAST RESEARCH ON THE STUDY OF THE PATHOGENESIS OF INTESTINAL INFECTIONS. OUTBREAK OF CHOLERA, BACILLARY DYSENTERY, AND INFECTION DUE TO SALMONELLA THOMPSON. CLASSIFICATION OF INTESTINAL PATHOLOGENIC ORGANISMS.
AD-403 119 DIV. 1A

*INVERTERS
POWER SUPPLIES

INFORMATION PRESENTED ON TWO INVERTER CIRCUITS, 1400 VA AND 500/25 VA, EMPLOYING SILICON CONTROLLED RECTIFIERS AS SWITCHING DEVICES.
AD-402 939 DIV. 8

*IONIC CURRENT
PLASMA PHYSICS

EXPERIMENTAL STUDY OF ELECTRIC BREAKDOWN WITH A VOLTAGE APPLIED BETWEEN ELECTRODES IMMERSED IN A PLASMA IN GAS AT LOW DENSITY.
AD-402 896 DIV. 25

*IONIZATION GAGES
ELECTRON DENSITY

DETERMINATION OF IMPEDANCE CHARACTERISTICS OF A CAPACITIVE IONOSPHERIC ROCKET PROBE SHOW THAT THE SHEATH MAKES A SIGNIFICANT CONTRIBUTION TO THE IMPEDANCE CHARACTERISTICS.
AD-403 135 DIV. 30

*IONOSPHERIC DISTURBANCES
RADIATION EFFECTS

TRAPPED RADIATION AND IONOSPHERIC PERTURBATIONS DUE TO AN IMPULSIVE NEUTRON SOURCE.
AD-403 020 DIV. 20

*IONOSPHERIC DISTURBANCES
RADIO TRANSMISSION

RELIABLE POLAR REGION HF COMMUNICATIONS SYSTEMS. DETERMINING THE WAYS BY WHICH COMMUNICATIONS TO AND WITHIN POLAR REGIONS MAY BE MAINTAINED THROUGHOUT IONOSPHERICALLY DISTURBED CONDITIONS.
AD-402 625 DIV. 5

*IONOSPHERIC PROPAGATION
MEASURING DEVICES (ELECTRICAL & ELECTRONIC)

ROCKET INSTRUMENTATION FOR THE MEASUREMENT OF AC CONDUCTIVITY, WITH A CAPACITANCE PROBE, AND LOW WAVE PROPAGATION IN THE LOWER IONOSPHERE.
AD-403 462 DIV. 8

*IONOSPHERIC PROPAGATION
WAVE TRANSMISSION

EXTENSION OF AUTHOR'S NON-LINEAR ELECTROMAGNETIC WAVE PROPAGATION STUDIES TO A MAGNETOIONIC MEDIUM.
AD-403 136 DIV. 8

*IRON COMPOUNDS
CHLORIDES

PREPARATION OF HIGH PURITY ANHYDROUS FERROUS CHLORIDE: SPECTROGRAPHIC ANALYSIS.
AD-403 265 DIV. 6

*ISOCYANATE PLASTICS
SYNTHESIS (CHEMISTRY)

SYNTHESIS OF HALOGENATED POLYURETHANE RESINS FOR STRUCTURAL LAMINATES INCREASING THERMAL STABILITY BY HALOGENATION; FLEXURAL STRENGTH AND ELASTICITY; SHOT-LIFE.
AD-402 709 DIV. 14

*ISOTOPE SEPARATION
TIN

A RAPID RADIOCHEMICAL PROCEDURE FOR TIN.
AD-403 022 DIV. 20

*JET BOMBERS
ATMOSPHERIC SOUNDING

HIGH-ALTITUDE ATMOSPHERIC SOUNDING WITH THE TU-20 AIRCRAFT. TRANSLATION OF RUSSIAN ARTICLE.
AD-403 013 DIV. 2

*JET BOMBERS
TRANSONIC CHARACTERISTICS

EFFECTS OF ATMOSPHERE TURBULENCE UPON FLIGHT AT LOW ALTITUDE AND HIGH SPEED.
AD-403 365 DIV. 9

*JET FIGHTERS
TRANSONIC CHARACTERISTICS

EFFECTS OF ATMOSPHERE TURBULENCE UPON FLIGHT AT LOW ALTITUDE AND HIGH SPEED.
AD-403 365 DIV. 9

*JETS
GAS FLOW

A HYPOTHESIS ON THE UNIVERSALITY OF EJECTION PROPERTIES OF TURBULENT GAS JETS AND ITS APPLICATION: MIXING TURBULENT JETS OF DIFFERENT DENSITY.
AD-402 581 DIV. 9

*JIGS

ARTICLES FROM MECHANIK, VOL. 35, NO. 12, PARIS, DECEMBER 1962, ON PRECISION MEASURING INSTRUMENTS AND UNIVERSAL CLAMPING DEVICES.
AD-403 286 DIV. 30

*JOB ANALYSIS
WEATHER STATIONS

EVALUATION OF GRADUATES OF ATC COURSE AP425231, APPRENTICE WEATHER OBSERVER.
AD-403 344 DIV. 23

*JOURNAL BEARINGS
ELECTRIC MOTORS

DEVELOPMENT OF GAS LUBRICATED JOURNAL AND THRUST BEARINGS FOR FLOREX MOTORS.
AD-402 686 DIV. 26

*JOURNAL BEARINGS
STABILITY

STEADY-STATE CHARACTERISTICS OF GAS-LUBRICATED SELF-ACTING, PARTIAL-ARC, JOURNAL BEARINGS OF FINITE WIDTH.
AD-402 801 DIV. 26

SOLUTION OF THE STABILITY PROBLEM FOR 360-DEGREE, SELF-ACTING, GAS-LUBRICATED BEARINGS OF INFINITE LENGTH.
AD-403 063 DIV. 26

*JUPITER
EXTRATERRESTRIAL RADIO WAVES

MILLIMETER (8.35 MM) RADIO EMISSION FROM JUPITER AND VENUS.
AD-403 478 DIV. 8

*KLYSTRONS
SCIENTIFIC RESEARCH

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES, VOL. 1 - CORNELL UNIVERSITY.
AD-403 025 DIV. 9

*KLYSTRONS
THEORY

RESEARCH REPORT ON THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF LINEAR BEAM IN MICROWAVE TUBES - VOL. 2.
AD-403 006 DIV. 8

*KRYPTON

IMPROVED HIGH MASS RANGE RESOLUTION WITH AN OMEGATRON MASS SPECTROMETER.
AD-402 906 DIV. 25

*LABELED SUBSTANCES
SYNTHESIS (CHEMISTRY)

PREPARATION OF CARBON-14 LABELED TETRAMETHYLAMMONIUM BROMIDE. CONDENSATION OF C-14 METHYL BROMIDE WITH TRIMETHYLAMINE. INDEPENDENCE OF YIELD (RANGE OF 100% THEORY) WITH VARYING AMOUNTS OF TRIMETHYLAMINE.
AD-403 407 DIV. 6

*LABORATORY EQUIPMENT
AEROBIOLOGY

PROCEDURES FOR USE OF THE HENDERSON APPARATUS FOR STUDY OF INFECTIOUS DISEASE TRANSMISSION BY THE RESPIRATORY ROUTE.
AD-402 787 DIV. 30

*LAMINAR BOUNDARY LAYER
COMPRESSIBLE FLOW

THEORY OF THE COMPRESSIBLE LAMINAR BOUNDARY GRADIENTS.
AD-403 049 DIV. 9

*LAMINATED PLASTICS
STABILITY

SYNTHESIS OF HALOGENATED POLYURETHANE RESINS FOR STRUCTURAL LAMINATES INCREASING THERMAL STABILITY BY HALOGENATION; FLEXURAL STRENGTH AND ELASTICITY; SHOT-LIFE.
AD-402 709 DIV. 14

*LAMINATED PLASTICS
THERMAL DIFFUSION

THERMAL STUDIES OF REINFORCED-PLASTIC MATERIALS. DIFFUSIVITY OF FIVE REINFORCED PLASTIC HEAT BARRIERS. RADIANT HEATING TESTS. MATHEMATICAL METHOD. PLASMA-JET ABLATION TESTS. FIT OF TEMPERATURE CURVES TO MATHEMATICAL MODEL.
AD-403 360 DIV. 14

*LANGUAGE
DATA PROCESSING SYSTEMS

PROPOSES ON A COMPUTER SYSTEM TO SUPPORT MECHANICAL TRANSLATION AND OTHER LINGUISTIC PROCESSES WHICH ARE POTENTIALLY APPLICABLE TO SCIENTIFIC DOCUMENTATION.
AD-403 438 DIV. 30

*LASERS
CRYSTAL GROWTH

RUBY IMPROVEMENT FOR LASERS: CRYSTAL GROWTH PROCESSES.
AD-403 133 DIV. 25

*LASERS
DIODES (SEMICONDUCTOR)

DEVELOPMENT OF IMPROVED ELECTRON INJECTION ARSENIDE, INDIUM PHOSPHIDE, AND OTHER SEMICONDUCTING COMPOUNDS.
AD-403 130 DIV. 25

*LASERS
RUBY

RUBY IMPROVEMENT FOR LASERS: CRYSTAL GROWTH PROCESSES.
AD-403 133 DIV. 25

*LAUNCH VEHICLES (AEROSPACE)
PAYLOAD

GUIDE TO PAYLOAD PLANNING FOR THE SLV-1B SPACE PROBE.
AD-402 767 DIV. 12

*LAVAL NOZZLES
LIQUIDS

TRANSLATIONS OF RUSSIAN ARTICLES ON THERMODYNAMIC PROPERTIES AND LEAKAGE OF GASES.
AD-402 598 DIV. 9

*LEADERSHIP
BEHAVIOR

THREE RESPONSE MODES IN SOCIAL INFLUENCE SITUATIONS: CONFORMITY, INDEPENDENCE, AND ANTI-CONFORMITY.
AD-403 463 DIV. 26

*LIFE SUPPORT
OXYGEN EQUIPMENT

A CAPILLARY-ACTION LIQUID-OXYGEN CONVERTER FOR WEIGHTLESS ENVIRONMENT.
AD-402 751 DIV. 1

*LIMITERS
DIODES (SEMICONDUCTOR)

MEASUREMENTS OF LINEWIDTH AND ANISOTROPY FROM HAM ON A 600 SERIES GA-YIG SINGLE-CRYSTAL FERRITE. A TWO-THRESHOLD ULTRADYNAMIC RANGE VARACTOR LIMITER WAS DESIGNED. PERFORMANCE OF COUPLED CIRCULATORS A ONE-PORT PARAMETRIC AMPLIFIER WERE ANALYZED.
AD-403 475 DIV. 8

*LINEAR ACCELERATORS
ELECTRON TUBES

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES. VOL. I - CORNELL UNIVERSITY.
AD-403 025 DIV. 8

*LINEAR PROGRAMMING

A DUALITY THEOREM FOR A CLASS OF CONTINUOUS LINEAR PROGRAMMING PROBLEMS: A DOCTORAL THESIS.
AD-402 617 DIV. 15

A DESCRIPTION OF THE NOTIONS OF DUALITY AND NETWORK FLOW AND HOW THESE ARE USED IN THE CONSTRUCTION OF ALGORITHMS FOR CERTAIN CLASSES OF LINEAR PROGRAMMING PROBLEMS.
AD-402 643 DIV. 15

*LIQUEFIED GASES
CRYOGENICS

TECHNIQUE FOR SOLIDIFYING HYDROGEN AND NEON: PROTOTYPE MODEL PRESSURE-CONTROL VALVE.
AD-403 445 DIV. 13

*LITHIUM COMPOUNDS
FLUORIDES

FUNDAMENTALS OF THE KINETICS AND MECHANISMS OF CONDENSATION, PARTICULARLY OF HOMOGENEOUS NUCLEATION FROM THE VAPOR PHASE.
AD-403 456 DIV. 27

*LITHIUM COMPOUNDS
HEAT OF FORMATION

HEAT OF FORMATION OF LITHIUM ALUMINUM HYDRIDE FROM HEATS OF SOLUTION OF ALUMINUM, LITHIUM, AND LITHIUM ALUMINUM HYDRIDE.
AD-403 346 DIV. 4

*LITHOSPHERE
ELECTRICAL PROPERTIES

GEOLOGICAL AND GEOPHYSICAL CONSIDERATIONS APPLICABLE TO RADIO PROPAGATION THROUGH ROCK STRATA ARE PRESENTED.
AD-402 704 DIV. 2

*LOGISTICS
LOGISTICS

A MATHEMATICAL FORMULATION AND SOLUTION OF A MULTIPLE-FREQUENCY SCHEDULING PROBLEM.
AD-403 342 DIV. 18

*LOW PRESSURE RESEARCH
VACUUM APPARATUS

SELECTED ARTICLES TRANSLATED FROM UKRAINIAN JOURNAL OF PHYSICS, VOL. 7, NO. 2.
AD-402 587 DIV. 25

*LUBRICATION
FRICTION

FRICTION AND WEAR OF METALS AT ELEVATED TEMPERATURES.
AD-403 419 DIV. 17

*MACHINE TRANSLATION
COMPUTERS

CONTINUING RESEARCH ON COMPUTER-AIDED RESEARCH IN MACHINE TRANSLATION.
AD-402 627 DIV. 30

PROPOSES ON A COMPUTER SYSTEM TO SUPPORT MECHANICAL TRANSLATION AND OTHER LINGUISTIC PROCESSES WHICH ARE POTENTIALLY APPLICABLE TO SCIENTIFIC DOCUMENTATION.

AD-403 438 DIV. 30

*MACHINES
VIBRATION

ANALYSIS TECHNIQUES FOR SUBMARINE MACHINERY INSTALLATIONS BY MECHANICAL IMPEDANCE METHODS.
AD-403 440 DIV. 31

*MAGNETIC CORES
DIFFERENTIAL EQUATIONS

METHOD FOR THE NUMERICAL SOLUTION OF A NON-LINEAR DIFFERENTIAL EQUATION RESULTING FROM AN EXTENSION OF KERESZTESI'S EQUATIONS ON FERRITE CORES.
AD-403 282 DIV. 19

*MAGNETIC PROPERTIES
RESONANCE

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY, CYCLOPROPANE DERIVATIVES.
AD-402 674 DIV. 20

*MAGNETOHYDRODYNAMICS
GENERATORS

ELECTRODELESS MAGNETOHYDRODYNAMICS GENERATOR TESTS.
AD-403 369 DIV. 25

*MAGNETOSTRICTIVE ELEMENTS
PHONONS

MAGNETOSTRICTIVE GENERATION OF MICROWAVE PHONONS BY THIN MAGNETIC FILMS AT X-BAND. GENERATION ON THE UNIFORM PRECESSION OR FERROMAGNETIC RESONANCE AND ON SPIN WAVE RESONANCE.
AD-403 474 DIV. 25

*MAGNETRONS
SPACE CHARGES

DESCRIPTION OF PLASMA MAGNETRONS WITH SMOOTH-BORE ANODES.
AD-403 437 DIV. 25

*MAINTENANCE VEHICLES
SHIELDING

TEST AND EVALUATION OF THREE SHIELDED-CAB ATK FUEL VEHICLES.
AD-402 748 DIV. 11

*MALFUNCTIONS
ELECTRONIC EQUIPMENT

PROGRAM 906, RELIABILITY PROGRAM STATUS AND DATA REPORT - VOL. 9.
AD-403 446 DIV. 8

*MANUFACTURING METHODS
CERAMIC CAPACITORS

RESEARCH ON A SUITABLE DISPERSING OR ANALYZING CRYSTAL FOR X-RAY SPECTROSCOPY.
AD-403 453 DIV. 7

*MANUFACTURING METHODS
EFFECTIVENESS

PROCESSES FOR THE REALIZATION OF DESIGN CONFIGURATIONS IN MATERIALS.
AD-403 142 DIV. 26

*MANUFACTURING METHODS
EXTRUSION

DEVELOPMENT OF AN IMPROVED EXTRUSION PROCESS FOR PRODUCING ULTRA-THIN AIRFRAME - QUALITY STEEL EXTRUSIONS: INTERIM REPORT.
AD-403 357 DIV. 26

*MANUFACTURING METHODS
MODULES (ELECTRONIC)

THE PROCEEDINGS OF THE FIRST MICRO-MODULE INDUSTRY CONFERENCE, PHILADELPHIA, 1964.
AD-402 716 DIV. 8

*MANUFACTURING METHODS
MOLYBDENUM

PRODUCTION METHOD FOR OBTAINING MOLYBDENUM WITH A LOW TRANSITION TEMPERATURE.
AD-403 305 DIV. 17

*MANUFACTURING METHODS
ROCKET CASES

CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES.
AD-403 459 DIV. 27

*MANUFACTURING METHODS
TRANSISTORS

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N13PMA GERMANIUM TRANSISTOR.
AD-403 125 DIV. 8

COMPLETION OF THE FINAL DESIGN OF THE PILOT LINE, JET ETCH TRANSISTOR TYPE 2N501A IS REPORTED. EMITTER AND COLLECTOR LEAD WIRE EVALUATION, METAGERMANIC SURFACE TREATMENT EVALUATION, BLACK PAINTING AS A FINAL FINISH.
AD-403 366 DIV. 8

*MANUFACTURING METHODS
TUNGSTEN ALLOYS

VACUUM ARC MELTING OF TUNGSTEN + 0.6% COLUMBIUM ALLOY.
AD-403 304 DIV. 17

TUNGSTEN-BASE ALLOYS AND 6-3% MO-BASE ALLOYS CONTAINING NOMINALLY 1% HF, 0.05% ZR HAVE BEEN SUCCESSFULLY CONVERTED TO 1/2-INCH DIAMETER BAR STOCK BY EXTRUSION AND SWAGING OPERATIONS.
AD-403 434 DIV. 17

*MASS SPECTROSCOPY

IMPROVED HIGH MASS RANGE RESOLUTION WITH AN OMEGATRON MASS SPECTROMETER.
AD-402 906 DIV. 25

*MATERIAL FORMING
BIBLIOGRAPHIES

ABSTRACTS OF OVER 700 REFERENCES ON THE SUBJECT OF HIGH-VELOCITY METALWORKING.
AD-403 493 DIV. 26

*MATHEMATICAL ANALYSIS

DUAL SERIES RELATIONS IN MATHEMATICAL PHYSICS.
AD-402 694 DIV. 19

*MATHEMATICAL ANALYSIS
STRESSES

DYNAMIC STRESSES AND DISPLACEMENTS AROUND CYLINDRICAL DISCONTINUITIES DUE TO PLANE SHEAR WAVES.
AD-402 937 DIV. 25

*MATHEMATICAL PREDICTION

A DESCRIPTION OF THE NOTIONS OF DUALITY AND NETWORK FLOW AND HOW THESE ARE USED IN THE CONSTRUCTION OF ALGORITHMS FOR CERTAIN CLASSES OF LINEAR PROGRAMMING PROBLEMS.
AD-402 643 DIV. 15

RELIABILITY INFERENCE.
AD-402 645 DIV. 15

*MATHEMATICS
ANALYSIS

A STUDY OF INVARIANCE OF SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS UNDER K-VECTOR FIELDS.
AD-402 804 DIV. 19

•MATRIX ALGEBRA

A DUALITY THEOREM FOR A CLASS OF CONTINUOUS LINEAR PROGRAMMING PROBLEMS: A DOCTORAL THESIS.
AD-402 617 DIV. 15

•MECHANICAL WAVES

DYNAMIC STRESSES AND DISPLACEMENTS AROUND CYLINDRICAL DISCONTINUITIES DUE TO PLANE SHEAR WAVES.
AD-402 937 DIV. 25

•MEDICAL EQUIPMENT
INSTRUMENTATION

A DIGITAL READOUT TECHNIC APPLICABLE TO LABORATORY AND AEROSPACE MEDICAL MONITORING OF PHYSIOLOGICAL DATA.
AD-403 481 DIV. 16

•MELTING
MATHEMATICAL ANALYSIS

UPPER AND LOWER BOUNDS IN PROBLEMS OF MELTING OR SOLIDIFYING SLABS.
AD-402 809 DIV. 25

•METAL PLATES
PLASTICITY

RESEARCH ON ENERGY ABSORBING STRUCTURES. THEORETICAL AND EXPERIMENTAL STUDIES OF CONVOLUTED TYPE STRUCTURES.
AD-402 854 DIV. 17

•METALLIC CRYSTALS
THERMAL STRESSES

THERMAL STRESS AT LOW-TEMPERATURES IN METALS.
AD-402 793 DIV. 17

•METALORGANIC COMPOUNDS
HYDRAULIC FLUIDS

IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS. REACTION PRODUCT BETWEEN TETRAISOPROPYLTITANATE AND BASIC ZINC ACETATE.
AD-403 355 DIV. 14

•METALS
DEFORMATION

THERMAL STRESS AT LOW-TEMPERATURES IN METALS.
AD-402 793 DIV. 17

•METALS
FATIGUE (MECHANICS)

THEORY OF METAL FATIGUE. STUDIES OF DYNAMIC-STRENGTH DETERMINATIONS WITH HIGH-FREQUENCY STRESS OSCILLATIONS DURING MACHINING OPERATIONS ON METALS AND ALLOYS.
AD-402 590 DIV. 17

•METALS
FRICTION

FRICTION AND WEAR OF METALS AT ELEVATED TEMPERATURES.
AD-403 419 DIV. 17

•METALS
MATERIAL FORMING

ABSTRACTS OF OVER 700 REFERENCES ON THE SUBJECT OF HIGH-VELOCITY METAL-WORKING.
AD-403 403 DIV. 26

•METEOROLOGICAL BALLOONS
MATERIALS

PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
AD-402 700 DIV. 1

•METEOROLOGICAL CHARTS

CYCLONE AND ANTICYCLONE PERIODIC VARIATIONS ON METEOROLOGICAL CHARTS FOR AREA SOUTH OF 50 DEG SOUTH.
AD-403 143 DIV. 2

•METEOROLOGICAL RADAR

RADAR METHODS IN METEOROLOGY.
AD-402 589 DIV. 2

•METEOROLOGY
RADAR

RADAR METHODS IN METEOROLOGY.
AD-402 589 DIV. 2

•MICROMINIATURIZATION (ELECTRONICS)
PACKAGED CIRCUITS

FABRICATION OF MICROELECTRONIC BLOCKS FOR TIME AND FREQUENCY CONTROL EQUIPMENT.
AD-403 476 DIV. 8

•MICROMINIATURIZATION (ELECTRONICS)
SYMPOSIA

THE PROCEEDINGS OF THE FIRST MICRO-MODULE INDUSTRY CONFERENCE, PHILADELPHIA, 1962.
AD-402 716 DIV. 8

•MICROPHONES
ACOUSTIC DETECTORS

TESTING OF A SENSITIVE CAPACITOR MICROPHONE WITH TEMPERATURE, HUMIDITY AND PRESSURE (ALTITUDE) EFFECTS CONSIDERED. A MICRORADIOGRAPH WAS ALSO TESTED, WITH CONSIDERATION GIVEN TO SIGNAL HANDLING.
AD-402 734 DIV. 8

•MICROPHONES
CAPACITANCE

TESTING OF A SENSITIVE CAPACITOR MICROPHONE WITH TEMPERATURE, HUMIDITY AND PRESSURE (ALTITUDE) EFFECTS CONSIDERED. A MICRORADIOGRAPH WAS ALSO TESTED, WITH CONSIDERATION GIVEN TO SIGNAL HANDLING.
AD-402 734 DIV. 8

•MICROWAVE AMPLIFIERS
ANALYSIS

RESEARCH REPORT ON THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF LINEAR BEAM TH MICROWAVE TUBES - VOL. 2.
AD-403 006 DIV. 8

•MICROWAVE AMPLIFIERS
TRAVELING WAVE TUBES

A MILLIMETER LOW-NOISE TRAVELING-WAVE AMPLIFIER.
AD-403 111 DIV. 8

•MICROWAVE OSCILLATORS
TUNNEL DIODES

ATTEMPTS TO DEVELOP A TUNNEL DIODE OSCILLATOR
AD-403 458 DIV. 8

•MILITARY TRAINING
SCHEDULING

OPERATIONS RESEARCH IN PRODUCTION OF SYSTEM TRAINING EXERCISES.
AD-402 624 DIV. 30

•MILLIMETER WAVES
PLANETARY ATMOSPHERES

MILLIMETER (8.35 MM) RADIO EMISSION FROM JUPITER AND VENUS.
AD-403 478 DIV. 8

•MITOSIS
RADIATION EFFECTS

EFFECTS OF RADIATIONS ON CELL DIVISION.
AD-403 109 DIV. 16

•MIXTURES
CHEMICAL REACTIONS

REACTIONS IN MIXTURES OF SOLIDS. REACTION MECHANISMS AND THERMODYNAMICS. APPLICATIONS IN CERAMICS, REFRACTORIES AND CEMENTS. TRANSLATION OF RUSSIAN BOOK.
AD-402 799 DIV. 8

•MODULES (ELECTRONIC)
MICROMINIATURIZATION (ELECTRONICS)

THE PROCEEDINGS OF THE FIRST MICRO-MODULE INDUSTRY CONFERENCE, PHILADELPHIA, 1962.
AD-402 716 DIV. 8

INVESTIGATION AND PRODUCTION OF MICRO-MODULES FOR A MICRO-MODULAR VERSION OF THE AN/PRC-51 HELMET RECEIVER AND HAND-HELD TRANSMITTER, AND MICRO-PAC DIGITAL COMPUTER.
AD-402 739 DIV. 8

•MOISTURE
MEASUREMENT

SOIL MOISTURE DATA FOR ITHACA, NEW YORK AREA.
AD-402 963 DIV. 2

•MOISTUREPROOFING
CHEMICALS

RAIN REPELLENT. SILICONE-TITANIUM COPOLYMERS PASTE AND LIQUID CATALYSTS. RE-EVALUATION OF SURFACE ACTIVE AGENTS IN CONJUNCTION WITH DIMETHYLDIETHOXYSILANE.
AD-402 667 DIV. 8

•MOLYBDENUM
MANUFACTURING METHODS

PRODUCTION METHOD FOR OBTAINING MOLYBDENUM WITH A LOW TRANSITION TEMPERATURE.
AD-403 395 DIV. 17

•MOLYBDENUM
OXIDATION

MATHEMATICAL ANALYSIS: IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER REFRACTORY METALS.
AD-403 329 DIV. 17

•MOLYBDENUM
SURFACES

STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
AD-402 932 DIV. 25

•MONITORS
SPACE MEDICINE

A DIGITAL READOUT TECHNIC APPLICABLE TO LABORATORY AND AEROSPACE MEDICAL MONITORING OF PHYSIOLOGICAL DATA.
AD-403 481 DIV. 16

•MONTE CARLO METHOD

A MONTE CARLO PROCEDURE TO EVALUATE THE ENERGY, ANGULAR DISTRIBUTION AND INTENSITY OF EITHER THE SCATTERED NEUTRON OR GAMMA RAY FLUX THAT PENETRATES A MULTIBEND DUCT.
AD-402 616 DIV. 25

THE AUTOCORRELATION AND JOINT DISTRIBUTION FUNCTIONS OF A PATH OF SEGMENTS.
AD-402 790 DIV. 15

•MOON
INFRARED RADIATION

LUNAR INFRARED MEASUREMENTS BY DEPARTMENT OF ASTRONOMY, UNIVERSITY OF MANCHESTER, GREAT BRITAIN.
AD-402 818 DIV. 2

•MOON
SPECTRA (INFRARED)

LUNAR INFRARED MEASUREMENTS BY DEPARTMENT OF ASTRONOMY, UNIVERSITY OF MANCHESTER, GREAT BRITAIN.
AD-402 818 DIV. 2

•MOTOR REACTIONS
TIME

SIMULTANEOUS ACTIVATION OF BIMANUAL CONTROLS: APPLICATION TO A PERSONAL SPACE-PROPULSION DEVICE.
AD-403 381 DIV. 28

•MOTOR REACTIONS
TRACKING TELESCOPES

UPPER EXTREMITY PROSTHETICS RESEARCH. THE PERFORMANCE OF HUMAN OPERATORS OF TRACKING SYSTEMS.
AD-403 402 DIV. 16

•MOUTH
MEDICINE

ORALLY EFFECTIVE MOSQUITO REPELLENTS: LIPID-RATIO AND CHLOROFORM-WATER DISTRIBUTION OF ORIENTAL REPELLENTS: SYNTHESIS OF N,N-DIETHYL-2-(4-ETHYLPHENOXY)ETHYLAMINE AND N,N-DIETHYL-N'-(N-PROPYL)PIPERAZINE.
AD-402 712 DIV. 16

•NAVAL AIRCRAFT
HYDRAULIC SYSTEMS

FLUID CONTAMINATION OF 143 NAVAL AIRCRAFT HYDRAULIC SYSTEMS.
AD-402 711 DIV. 1

•NAVAL RESEARCH LABORATORIES
BIBLIOGRAPHIES

A BIBLIOGRAPHY OF UNCLASSIFIED NRL FORMAL REPORTS: NUMBERS 1000-5700.
AD-402 910 DIV. 32

•NAVIGATIONAL AIDS
MOORING

FEASIBILITY STUDY FOR PLACEMENT OF VORTAC AT SEA.
AD-402 699 DIV. 19

•NEON
SOLIDIFIED GASES

TECHNIQUE FOR SOLIDIFYING HYDROGEN AND NEON: PROTOTYPE MODEL PRESSURE-CONTROL VALVE.
AD-403 445 DIV. 13

•NERVE CELLS
BRAIN

ELECTROPHYSIOLOGICAL, HISTOCHEMICAL, AND CYTOARCHITECTURAL ANALYSES OF BRAIN FUNCTION: EXCITATION. TRANSLATION OF FOREIGN RESEARCH.
AD-402 523 DIV. 16

*NERVE CELLS
MOLECULAR STRUCTURE

CHEMICAL COMPOSITION AND MOLECULAR ORGANIZATION OF LIPOID AXONS. ANALYSIS OF THE GIANT FIBERS OF THE SQUID DOSIDICUS GIGAS. FUNCTION OF THE FIBROUS PROTEIN.
AD-602 870 DIV. 16

*NERVOUS SYSTEM
PROGRAMMING (COMPUTERS)

PATTERN-RECOGNIZING AND LEARNING NETWORKS; NETWORKS FOR SELECTING PATTERNED INPUTS AND OUTPUTS; COMPUTER MODEL OF SENSORIMOTOR DEVELOPMENT; MATHEMATICAL THEORY OF SENSORIMOTOR ORGANIZATION AND PERCEPTION.
AD-603 498 DIV. 29

*NEUROMUSCULAR TRANSMISSION
CEPHALOPODA

CHEMICAL COMPOSITION AND MOLECULAR ORGANIZATION OF LIPOID AXONS. ANALYSIS OF THE GIANT FIBERS OF THE SQUID DOSIDICUS GIGAS. FUNCTION OF THE FIBROUS PROTEIN.
AD-602 870 DIV. 16

*NEUTRON SCATTERING

A MONTE CARLO PROCEDURE TO EVALUATE THE ENERGY ANGULAR DISTRIBUTION AND INTENSITY OF EITHER THE SCATTERED NEUTRON OR GAMMA RAY FLUX THAT PENETRATES A MULTIREGION ONLY.
AD-602 616 DIV. 25

*NEUTRONS

NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR NEVADA TEST SITE SOIL.
AD-603 371 DIV. 20

*NEUTRONS
TRANSPORT PROPERTIES

A STOCHASTIC PROCESS METHOD (SPM) FOR NEUTRON PROBLEMS AND A COMPUTER PROGRAM FOR THE METHOD.
AD-603 485 DIV. 20

*NICKEL
ELECTRODES

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ABSORBED SUBSTANCES. NICKEL AND PLATINUM ELECTRODES.
AD-603 343 DIV. 4

*NIOBIUM ALLOYS
ELECTROLYTIC CAPACITORS

ELECTROLYTIC TANTALUM AND NIOBIUM ALLOY
AD-603 279 DIV. 8

*NUCLEAR ENERGY

A NOVEL ENERGY CONVERSION TECHNIQUE FOR AEROSPACE USE AS A RADIOISOTOPE POWERED ELECTRICAL OUTPUT POWER SOURCE.
AD-602 695 DIV. 20

*NUCLEAR EXPLOSIONS
BLAST

DIRECTLY-TRANSMITTED GROUND PHENOMENA FOR CASES OF ZERO AND LARGE AXIAL MAGNETIC FIELD. REGIONS IN THE CLOSE-IN REGION.
AD-603 054 DIV. 2

*NUCLEAR EXPLOSIONS
SIMULATION

LOW-YIELD UNDERWATER EXPLOSION TANK AND ASSOCIATED INSTRUMENTATION.
AD-603 032 DIV. 42

*NUCLEAR EXPLOSIONS
UNDERGROUND EXPLOSIONS

DETERMINATION OF SEISMIC WAVE SHAPES EMITTED FROM AN UNDERGROUND NUCLEAR EXPLOSION.
AD-603 080 DIV. 2

*NUCLEAR MAGNETIC RESONANCE

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. CYCLOPROPANE DERIVATIVES.
AD-602 674 DIV. 20

*NUCLEAR MAGNETIC RESONANCE
ALKALI METAL COMPOUNDS

NUCLEAR MAGNETIC RESONANCE STUDY OF THE OCTAHEDRIC STRUCTURE OF SODIUM-, POTASSIUM-, CESIUM-, AND AMMONIUM HEXAFLUOROPHOSPHATES BETWEEN 77 AND 400 K.
AD-603 410 DIV. 25

*NUCLEAR MODELS
NUCLEI

RESEARCH ON APPLICATION OF NUCLEAR SHELL MODELS TO CALCULATION OF ENERGIES OF GROUND STATES AND EXCITED STATES OF NUCLEI.
AD-603 038 DIV. 20

*NUCLEAR PROPERTIES
ENERGY

SPHERICAL NUCLEI WITH SIMPLE RESIDUAL FORCES.
AD-603 411 DIV. 20

*NUCLEAR PROPERTIES
PHENIUM

THE NUCLEAR PROPERTIES OF PHENIUM.
AD-602 868 DIV. 20

*NUCLEAR REACTORS
PERTURBATION THEORY

TRAPPED RADIATION AND IONOSPHERIC PERTURBATIONS DUE TO AN IMPULSIVE NEUTRON SOURCE.

AD-603 020 DIV. 20

*NUCLEAR RESONANCE
ROTATION

DEVELOPMENT OF A MAGNETIC INDUCTION GYROSCOPE WAS COMPLETED AND EXPERIMENTATION WITH NUCLEAR RESONANCE USING STIMULATED ROTATION CONTINUED.
AD-602 691 DIV. 22

*NUCLEAR RESONANCE
SPECTROSCOPY

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. CYCLOPROPANE DERIVATIVES.
AD-602 674 DIV. 20

*NUCLEAR WARFARE
COSTS

THE INVOLVEMENT OF COST IN DECISIONS AND RISK CONCERNING CENTRAL WAR.
AD-602 990 DIV. 32

*NUCLEAR WEAPONS
EXPLOSION EFFECTS

A DESCRIPTION OF NUCLEAR WEAPON EFFECTS IN THE CLOSE-IN REGION TO PROVIDE THE DESIGNER OF PROTECTIVE CONSTRUCTION USEFUL INPUTS FOR STRUCTURAL ANALYSIS AND DESIGN.
AD-603 028 DIV. 20

APPENDICES TO FINAL REPORT ON UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION.
AD-603 073 DIV. 20

AIR-INDUCED EFFECTS AND DIRECTLY-TRANSMITTED EFFECTS OF NUCLEAR WEAPON SURFACE BURST ON UNDERGROUND STRUCTURES.
AD-603 123 DIV. 22

*NUMERICAL ANALYSIS

CONVOLUTION INTEGRAL EQUATIONS IN THE FORM OF A LAPLACE TRANSFORM SOLVED BY TRANSFORM INVERSION.
AD-603 426 DIV. 15

*NUMERICAL METHODS AND PROCEDURES

PROBABILISTIC TREATMENT OF RANDOM-WALK PROCESS.
AD-603 334 DIV. 15

*OCEAN BOTTOM
REFLECTION

OCEANOGRAPHIC VESSEL BLAP CRUISE 283 WHICH INCLUDED ECHO-SOUNDING SURVEYS, SCATTERING LAYER OBSERVATIONS, AND SEISMIC REFRACTION STUDIES.
AD-603 141 DIV. 2

*OCEANOGRAPHIC VESSELS
MODEL TESTS

CALCULATED NATURAL VERTICAL HULL FREQUENCIES AND MODAL MODES OF SURVEYING SHIP AGS 2.
AD-603 480 DIV. 31

*OCEANOLOGY
GEOLOGY

INVESTIGATIONS BY VARIOUS BUREAUS OF SEDIMENTATION AND ENVIRONMENTS OF DEPOSITION IN THE CARIBBEAN AND CAPPECHE BANK REGIONS.
AD-603 128 DIV. 2

*ORBITAL TRAJECTORIES
FLIGHT SIMULATORS

SATRAN, SIMULATOR DESIGN AND DESCRIPTION.
AD-602 684 DIV. 12

*ORGANIC COMPOUNDS
HYDRAULIC FLUIDS

DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
AD-602 755 DIV. 14

*ORGANIC COMPOUNDS
ORGANIC COMPOUNDS, OTHER

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. CYCLOPROPANE DERIVATIVES.
AD-602 674 DIV. 20

DIMETHYLACETYLENE WAS IRRADIATED WITH COBALT-60 GAMMA RAYS--HYDROGEN, METHANE, ACETYLENE, PROPENE, PROPYNE, CIS AND TRANS- 2-BUTENE, BUTANE, 1,2-BUTADIENE AND VINYLACETYLENE WERE IDENTIFIED AS RADIOLYSIS PRODUCTS. EXPLANATION GIVEN IN TERMS OF ION-MOLECULE AND FREE RADICAL REACTIONS.
AD-602 974 DIV. 4

PLATINUM PYROLYSIS-TUBE METHOD OF DETERMINING OXYGEN IN FLUORINE CONTAINING COMPOUNDS: TEFLON, AND PERFLUOROBUTYL ETHER.
AD-603 359 DIV. 4

*ORGANIC COMPOUNDS
PHARMACOLOGY

ORALLY EFFECTIVE MOSQUITO REPELLENT: LIPID-WATER AND CHLOROFORM-WATER DISTRIBUTION OF POTENTIAL REPELLENTS; SYNTHESIS OF N,N-DIETHYL-2-A-DIMETHYLBENZAMIDE AND N,N-DIETHYL-M-(N-PROPYL) BENZAMIDE.
AD-602 712 DIV. 16

*ORGANIC COMPOUNDS
SYNTHESIS (CHEMISTRY)

SYNTHESIS OF HALOGENATED POLYURETHANE RESINS FOR STRUCTURAL LAMINATES INCREASING THERMAL STABILITY BY HALOGENATION; FLEXURAL STRENGTH AND ELASTICITY; POT-LIFE.
AD-602 709 DIV. 14

REACTIONS OF DIALKYLAMINOBORON COMPOUNDS WITH AROMATIC ISOCYANATES AND ISOTHIOCYANATES.
AD-603 376 DIV. 4

*OXIDATION
MOLYBDENUM ALLOYS

MATHEMATICAL ANALYSIS; IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
AD-603 329 DIV. 17

*OXYGEN
MICROANALYSIS

PLATINUM PYROLYSIS-TUBE METHOD OF DETERMINING OXYGEN IN FLUORINE CONTAINING COMPOUNDS: TEFLON, AND PERFLUOROBUTYL ETHER.
AD-603 359 DIV. 4

*OXYGEN
PRODUCTION

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ABSORBED SUBSTANCES. NICKEL AND PLATINUM ELECTRODES.
AD-603 343 DIV. 4

*OXYGEN COMPOUNDS
CHEMICAL REACTIONS

CHEMICAL REACTIONS OF OXYGEN FLUORIDES; SYNTHESIS OF XENON TETRAFLUORIDE BY ELECTRIC DISCHARGE; SYNTHESIS OF XENON OXYFLUORIDES AND KRYPTON TETRAFLUORIDE.
AD-603 447 DIV. 4

*OXYGEN COMPOUNDS
MICROANALYSIS

PLATINUM PYROLYSIS-TUBE METHOD OF DETERMINING OXYGEN IN FLUORINE CONTAINING COMPOUNDS: TEFLON, AND PERFLUOROBUTYL ETHER.
AD-603 359 DIV. 4

*OZONE
DISTRIBUTION

SYNOPTICAL MEASUREMENTS WERE MADE OF THE VERTICAL OZONE DISTRIBUTION. THE CORRELATION OF THE OZONE VARIATION WITH THE WEATHER SITUATION WAS STUDIED.
AD-603 398 DIV. 2

*PACKAGED CIRCUITS
MICROMINIATURIZATION (ELECTRONICS)

FABRICATION OF MICROELECTRONIC BLOCKS FOR TIME AND FREQUENCY CONTROL EQUIPMENT.
AD-603 476 DIV. 8

*PARACHUTES
MODEL TESTS

WIND TUNNEL STUDY OF PARACHUTE CLUSTERING.
AD-602 777 DIV. 1

*PARASITES
PLATYHELMINTHS

IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS. CHEMOTHERAPY OF PARAGONIMIASIS WITH BITHIONOL.
AD-603 110 DIV. 16

***PARTIAL DIFFERENTIAL EQUATIONS**

A STUDY OF INVARIANCE OF SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS UNDER K-VECTOR FIELDS.
AD-402 804 DIV. 15

***PARTICLE SIZE**
MATHEMATICAL ANALYSIS

BRIGHTNESS OF THE SKY IN THE VICINITY OF THE SUN.
AD-403 103 DIV. 2

***PARTICLES**
REFRACTIVE INDEX

DISSIPATION EFFECTS CONTROLLING THE ELECTRICAL MORPHOLOGY OF THE MESOSPHERE.
AD-403 335 DIV. 2

***PATHOLOGY**
INFECTIONS

FAR EAST RESEARCH ON THE STUDY OF THE PATHOGENESIS OF INTESTINAL INFECTIONS, OUTBREAK OF CHOLERA, BACILLARY DYSENTERY, AND INFECTION DUE TO SALMONELLA THAMPSON. CLASSIFICATION OF INTESTINAL PATHOLOGENIC ORGANISMS.
AD-403 119 DIV. 16

***PAYLOAD**
SCHEDULING

GUIDE TO PAYLOAD PLANNING FOR THE SLV-1B SPACE PROBE.
AD-402 767 DIV. 12

***PERCEPTION**
MOTION

A STUDY OF PILOTS AND POTENTIAL HELICOPTER PILOTS TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED.
AD-403 401 DIV. 16

***PERSONALITY**
GROUP DYNAMICS

THREE RESPONSE MODES IN SOCIAL INFLUENCE SITUATIONS: CONFORMITY, INDEPENDENCE, AND ANTI-CONFORMITY.
AD-403 463 DIV. 28

***PERSPIRATION**
MEASUREMENT

CONTINUOUS SIMULTANEOUS REGISTRATION OF SWEATING AND BLOOD FLOW IN A SMALL SKIN AREA.
AD-402 762 DIV. 16

***PHASE STUDIES**
CARBIDES

RESULTS OF AN INVESTIGATION OF PHASE EQUILIBRIA IN THE BINARY SYSTEMS, ZIRCONIUM-CARBON, TANTALUM-CARBON, BORON-CARBON.
AD-402 797 DIV. 17

***PHONONS**
MICROWAVE FREQUENCY

MAGNETOSTRICTIVE GENERATION OF MICROWAVE PHONONS BY THIN MAGNETIC FILMS AT X-BAND. GENERATION ON THE UNIFORM PRECESSION OR FERROMAGNETIC RESONANCE AND ON SPIN WAVE RESONANCE.
AD-403 474 DIV. 25

***PHOSPHATES**
NUCLEAR MAGNETIC RESONANCE

NUCLEAR MAGNETIC RESONANCE STUDY OF THE DYNAMIC STRUCTURE OF SODIUM, POTASSIUM, CESIUM, AND RUBIDIUM HEXAFLUOROPHOSPHATES BETWEEN 77 AND 400 K.
AD-403 410 DIV. 25

***PHOSPHORUS**
CHEMICAL ANALYSIS

CHEMICAL ANALYSIS OF R&D PHOSPHORUS: DETERMINATION OF COPPER, IRON, AND ALUMINUM.
AD-403 409 DIV. 4

***PHOTOELECTRIC CELLS (SEMICONDUCTOR)**
SEMICONDUCTING FILMS

CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
AD-403 053 DIV. 8

***PHOTOGRAPHIC EMULSIONS**
TRACKING

LATENT IMAGE FADING IN ILFORD K-0 AND K-2 EMULSIONS OF PHOTOGRAPHIC PLATES.
AD-402 838 DIV. 24

***PHOTOGRAPHIC LENSES**

THE DEVELOPMENT OF PRODUCTION MANUFACTURING METHODS FOR EXTREMELY ACCURATE ASPHERIC LENS SURFACES.
AD-402 952 DIV. 24

***PHYSICS**

SELECTED ARTICLES TRANSLATED FROM UKRAINIAN JOURNAL OF PHYSICS, VOL. 7, NO. 2.
AD-402 587 DIV. 25

***PICKET SHIPS**
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, TELEMETERING, AND TUGS.
AD-403 060 DIV. 31

***PIEZOELECTRIC EFFECT**
ORGANIC COMPOUNDS

PIEZO-RESISTIVE CHARACTERISTICS OF SOME ORGANIC SEMICONDUCTING POLYMERS. POLYACENE QUINONE RADICAL POLYMERS.
AD-403 361 DIV. 14

***PILOTS**
PERFORMANCE TESTS

A STUDY OF PILOTS AND POTENTIAL HELICOPTER PILOTS TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED.
AD-403 401 DIV. 16

***PILOTS**
POSITIONING REACTIONS

A STUDY OF PILOTS AND POTENTIAL HELICOPTER PILOTS TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED.
AD-403 401 DIV. 16

***PIRICULARIA**
CEREALS

RESEARCH ON PHYSIOLOGICAL RACES OF PIRICULARIA ORYZAE.
AD-402 782 DIV. 18

***PLASMA OSCILLATIONS**

POSITIVE-COLUMN STRIATIONS IN GASEOUS CONDUCTORS. PERIODIC PHENOMENA IN LOW DENSITY GASEOUS PLASMAS ARE EXAMINED.
AD-403 436 DIV. 25

***PLASMA PHYSICS**

POSITIVE-COLUMN STRIATIONS IN GASEOUS CONDUCTORS. PERIODIC PHENOMENA IN LOW DENSITY GASEOUS PLASMAS ARE EXAMINED.
AD-403 436 DIV. 25

***PLASMA PHYSICS**
ELECTROMAGNETIC WAVES

AN EXAMINATION OF GUIDED ELECTROMAGNETIC MODES ALONG A HOMOGENEOUS CIRCULAR COLUMN OF PLASMA EMBEDDED IN FREE SPACE FOR THE TWO EXTREME TAINING TO UNDERGROUND EFFECTS OF NUCLEAR WEAPON: IN THE CLOSE-IN REGION.
AD-402 680 DIV. 25

***PLASMA PHYSICS**
ELECTRON TUBES

DESCRIPTION OF PLASMA MAGNETRONS WITH SMOOTH-BORE ANODES.
AD-403 837 DIV. 25

***PLASMA PHYSICS**
GAS IONIZATION

SEVEN BASIC EQUATIONS ARE DERIVED FOR SMALL-AMPLITUDE PERTURBATIONS IN PARTIALLY-IONIZED GASES.
AD-403 127 DIV. 25

***PLASMA PHYSICS**
MAGNETIC FIELDS

SELECTED ARTICLES TRANSLATED FROM UKRAINIAN JOURNAL OF PHYSICS, VOL. 7, NO. 2.
AD-402 587 DIV. 25

***PLASMA PHYSICS**
MECHANICS

A COLLECTION OF REPORTS ON SATELLITE PLASMA SHEATH ANOMALIES.
AD-403 287 DIV. 12

***PLASMA PHYSICS**
SATELLITES (ARTIFICIAL)

A COLLECTION OF REPORTS ON SATELLITE PLASMA SHEATH ANOMALIES.
AD-403 287 DIV. 12

***PLASTICS**
SMOKE MUNITIONS

SURVEY OF RECENT INVESTIGATION OF PLASTIC-BONDED AND CASTABLE SMOKE COMPOSITIONS.
AD-403 499 DIV. 3

***PLATING**
CADMIUM

EVALUATION OF CADMIUM PLATING SYSTEMS FOR HYDROGEN EMBRITTLEMENT.
AD-402 983 DIV. 4

***PLATINUM**
ELECTRODES

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ADSORBED SUBSTANCES. NICKEL AND PLATINUM ELECTRODES.
AD-403 343 DIV. 4

***POLAR REGIONS**
RADIO COMMUNICATION SYSTEMS

RELIABLE POLAR REGION HF COMMUNICATIONS SYSTEMS, DETERMINING THE WAYS BY WHICH COMMUNICATIONS TO AND WITHIN POLAR REGIONS MAY BE MAINTAINED THROUGHOUT IONOSPHERICALLY DISTURBED CONDITIONS.
AD-402 625 DIV. 9

***POLITICAL SCIENCE**

DEVELOPMENTS IN THE FIELD OF INTERNATIONAL REGULATIONS OF DEEP-SEA FISHING AND WHALING.
AD-402 544 DIV. 32

***POLYMERS**
METEOROLOGICAL BALLOONS

PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
AD-402 700 DIV. 1

***POLYMERS**
SEMICONDUCTORS

PIEZO-RESISTIVE CHARACTERISTICS OF SOME ORGANIC SEMICONDUCTING POLYMERS. POLYACENE QUINONE RADICAL POLYMERS.
AD-403 361 DIV. 14

***POLYNOMIALS**

FILTERS (ELECTROMAGNETIC WAVES).
AD-402 778 DIV. 15

***POROUS METALS**
ADSORPTION

STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ADSORBED SUBSTANCES. NICKEL AND PLATINUM ELECTRODES.
AD-403 343 DIV. 4

***POWDER METALS**
SINTERING

RESULTS OF SINTERING STUDIES ON ATOMIZED AND SYNTHESIZED ALLOY POWDERS: OPTIMUM SINTERING CONDITIONS DEFINED.
AD-402 780 DIV. 17

***POWER EQUIPMENT**
FEASIBILITY STUDIES

ELECTRODELESS MAGNETOHYDRODYNAMICS GENERATOR TESTS.
AD-403 369 DIV. 25

***POWER SUPPLIES**
TRANSISTORS

DC TO DC POWER CONVERTER EMPLOYING TRANSISTORS AND A CERAMIC PIEZOELECTRIC TRANSFORMER.
AD-402 985 DIV. 9

***PRESSURE VESSELS**
FILAMENT WOUND CONSTRUCTION

THE STRENGTH DEGRADATION OF FILAMENT WOUND PRESSURE VESSELS SUBJECTED TO A HISTORY OF LOADING.
AD-403 122 DIV. 14

***PRESSURE VESSELS**
MATERIAL FORMING

MATERIALS AND PROCESSES FOR PRODUCING LARGE-DIAMETER INTERMEDIATE MISSILE AND ROCKET MOTOR CASES.
AD-402 636 DIV. 17

***PRESSURE VESSELS**
STRETCH FORMING

CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES.
AD-403 459 DIV. 27

***PROBABILITY**

ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT.
AD-402 608 DIV. 1

***PROBABILITY**
STATISTICAL DISTRIBUTIONS

PROBABILISTIC TREATMENT OF RANDOM-WALK PROCESS.
AD-403 334 DIV. 19

***PROGRAMMING (COMPUTERS)**

COMPUTER PROGRAMMING DESIGN SPECIFICATIONS FOR MODIFICATIONS TO MULTICS.
AD-402 900 DIV. 30

PROGRAM ON COMPUTER UTILIZATION REPORTS WHICH USE PUNCHED CARDS AS INPUT AND GENERATE TIME UTILIZATION ON ALL COMPUTING EQUIPMENT.
AD-402 903 DIV. 30

CONTROL OF AND AUTOMATIC ALLOCATION FOR LARGE SCALE CYCLING SYSTEMS.
AD-402 904 DIV. 30

***PROGRAMMING (COMPUTERS)**
AIR TRAFFIC CONTROL SYSTEMS

A FLIGHT DATA PROCESSING SYSTEM HAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS ETA DIFFERENT KINDS OF FLIGHT DATA MESSAGE.
AD-403 423 DIV. 30

A FLIGHT DATA PROCESSING SYSTEM HAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS ETA DIFFERENT KINDS OF MESSAGES. COMPUTER ROUTINES FOR THE SYSTEM ARE PRESENTED.
AD-403 484 DIV. 30

FLOW CHARTS, SYSTEM DIAGRAMS, AND COMPUTER ROUTINE DIAGRAMS FOR COMPUTER PROGRAMMING OF PHASE I RADAR PROGRAM OF PROJECT MOL ION-MONITORING. VOL. II-APPENDICES.
AD-403 495 DIV. 30

***PROGRAMMING (COMPUTERS)**
ERROR

FINAL REPORT: PROGRAMMING AND COMPUTING SERVICE FOR EVALUATION OF COMPOSITE ARMOR.
AD-403 263 DIV. 22

***PROGRAMMING (COMPUTERS)**
COMMAND AND CONTROL SYSTEMS

SOFTWARE DESIGN AND IMPLEMENTATION: A STUDY OF COMPUTERS IN COMMAND AND CONTROL SYSTEMS.
AD-403 451 DIV. 30

***PROGRAMMING (COMPUTERS)**
DATA STORAGE SYSTEMS

THE STORAGE, RETRIEVAL, AND UTILIZATION OF A SERVICE ROUTINE LIBRARY FOR A COMPUTER SYSTEM.
AD-403 397 DIV. 30

***PROGRAMMING (COMPUTERS)**
GUIDED MISSILE RANGES

USE OF A DIGITAL COMPUTER AS AN AID IN SCHEDULING OPERATIONS AT THE PACIFIC MISSILE RANGE.
AD-402 612 DIV. 12

***PROGRAMMING (COMPUTERS)**
HANDBOOKS

SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS.
AD-402 659 DIV. 30

SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS.
AD-402 662 DIV. 30

***PROGRAMMING (COMPUTERS)**
ORBITAL TRAJECTORIES

A PROGRAM ROUTINE TO PREPARE FLIGHT SUPPORT DATA PACKAGE TAPES FOR VEHICLES WHICH CARRY PROGRAMMABLE ORBITAL TIMERS.
AD-402 660 DIV. 30

***PROGRAMMING (COMPUTERS)**
SATELLITE NETWORKS

UTILITY PROGRAM DESCRIPTIONS, MILESTONE II, WRITE CHANGE TAPE.
AD-402 648 DIV. 30

INTRODUCTION TO THE SATELLITE CONTROL FACILITY'S COMPUTER PROGRAM SYSTEMS MANUAL.
AD-402 661 DIV. 30

PROVIDES OCTAL, SYMBOLIC, FLOATING POINT DECIMAL, OR BCD MODES OF LOF ROUTINES USING THEIR NAMES TO DEFINE THE AREAS IN CORE TO BE DUMPED.
AD-402 896 DIV. 30

PROGRAM TO OBTAIN AN OUTPUT OF TIMES WHERE A SATELLITE ENTERS AND LEAVES THE EARTH'S SHADOW.
AD-402 908 DIV. 30

PRESENTS AN OCTAL, SYMBOLIC, FLOATING POINT DECIMAL, OR BCD CORE DUMP (CORE).
AD-402 899 DIV. 30

UTILITY SYSTEM PROGRAMING PROPOSAL FOR MODIFICATIONS TO THE OSCON SYSTEM.
AD-402 901 DIV. 30

PROGRAM TO READ SPECIFIC INFORMATION ON TRACKING MESSAGES OR VEHICLE TIME MESSAGES RELATE TO A PARTICULAR STATION, VEHICLE AND REVOLUTION.
AD-402 902 DIV. 30

***PROSTHETICS**
ARMS

UPPER EXTREMITY PROSTHETICS RESEARCH. THE PERFORMANCE OF HUMAN OPERATORS OF TRACKING SYSTEMS.
AD-403 402 DIV. 16

***PROTEINS**
SURFACE PROPERTIES

THE STRUCTURE AND SURFACE PROPERTIES OF PROTEIN MONOLAYERS.
AD-402 871 DIV. 18

***PSYCHOMOTOR TESTS**
ARMS

SIMULTANEOUS ACTIVATION OF BIMANUAL CONTROLS: APPLICATION TO A PERSONAL SPACE-PROPULSION DEVICE.
AD-403 381 DIV. 28

***QUEUEING THEORY**

SIMPLIFIED QUEUEING MODEL FOR THE MOSL SYSTEM.
AD-402 826 DIV. 18

***RADAR ANTENNAS**
ANTENNA LOBES

REDUCTION OF SIDELOBES AND POINTING ERRORS IN PHASED ARRAY RADARS BY RANDOMIZING QUANTIZATION STEPS.
AD-402 953 DIV. 8

***RADAR ECHO AREAS**
RAINFALL

THE SYNOPTIC SITUATION AND AN ANALYSIS OF CLOUD COVER AS SEEN BY TIROS III SATELLITE FOR A TRANSLATIONAL MOTION OF PRECIPITATION ECHOES AND COMPARISON OF THESE MOTIONS WITH WINDS ALOFT.
AD-402 831 DIV. 2

***RADAR ECHO AREAS**
REENTRY VEHICLES

PRODUCT ASSURANCE PROGRAM TECHNICAL REPORT FOR THE RADAR CROSS-SECTION REDUCTION OF REENTRY VEHICLES.
AD-402 807 DIV. 12

***RADAR EQUIPMENT**
MATHEMATICAL ANALYSIS

DERIVATION OF EXACT FORMULAS FOR CORRECTING RADAR ANGLE DATA FOR ERRORS CAUSED BY NON-PERPENDICULARITY OF THE RADAR AXES.
AD-403 469 DIV. 6

***RADIATION CHEMISTRY**
ALIPHATIC COMPOUNDS

DIMETHYLACETYLENE WAS IRRADIATED WITH COBALT-60 GAMMA RAYS-HYDROGEN, METHANE, ACETYLENE, PROPENE, PROPYNE, CIS AND TRANS- 2-BUTENE, BUTANE, 1,2-BUTADIENE AND VINYLACETYLENE WERE IDENTIFIED AS RADIOLYSIS PRODUCTS. EXPLANATION GIVEN IN TERMS OF ION-MOLECULE AND FREE RADICAL REACTIONS.
AD-402 974 DIV. 6

***RADIATION CHEMISTRY**
TIN

A RAPID RADIOCHEMICAL PROCEDURE FOR TIN.
AD-403 022 DIV. 20

***RADIATION DAMAGE**
ELECTRONIC EQUIPMENT

TRANSIENT RADIATION EFFECTS ON ELECTRONIC COMPONENTS AND SEMICONDUCTOR DEVICES.
AD-403 117 DIV. 8

***RADIATION EFFECTS**
REPRODUCTIVE SYSTEM

EFFECTS OF RADIATIONS ON CELL DIVISION.
AD-403 109 DIV. 16

***RADIATION INJURIES**

TRANSLATION OF FOREIGN RESEARCH: RADIATION INJURY MECHANISM IN MOUSE OVARIES: ELECTRICAL STIMULATION OF THE HEART BY RADIOFREQUENCY IMPULSE TRANSMISSION.
AD-402 519 DIV. 16

***RADIATION MEASUREMENT SYSTEMS**
GUIDED MISSILE DETECTION

A SURVEY OF R-F RADIATION FROM ROCKET PLUMES AND RELATED SUBJECTS.
AD-336 049 DIV. 6

***RADIATION MEASUREMENT SYSTEMS**
MICROWAVE EQUIPMENT

A SURVEY OF R-F RADIATION FROM ROCKET PLUMES AND RELATED SUBJECTS.
AD-336 049 DIV. 6

***RADIO COMMUNICATION SYSTEMS**
HIGH FREQUENCY

INFORMATION ON FORECASTING ANOMALOUS PROPAGATION CONDITIONS FOR IMPROVING RADIO COMMUNI-
AD-403 140 DIV. 2

***RADIO COMMUNICATION SYSTEMS**
POLAR REGIONS

RELIABLE POLAR REGION HF COMMUNICATIONS SYSTEMS. DETERMINING THE WAYS BY WHICH COMMUNICATIONS TO AND WITHIN POLAR REGIONS MAY BE MAINTAINED THROUGHOUT IONOSPHERICALLY DISTURBED CONDITIONS.
AD-402 625 DIV. 5

***RADIO WAVES**
PROPAGATION

INFORMATION ON FORECASTING ANOMALOUS PROPAGATION CONDITIONS FOR IMPROVING RADIO COMMUNI-
AD-403 140 DIV. 2

***RADIOACTIVE FALLOUT**

MEASUREMENT OF RADIOACTIVITY IN ATMOSPHERE BY MEANS OF BALLOON EQUIPMENT.
AD-403 278 DIV. 20

***RADIOACTIVE FALLOUT**
SHELTERS

EFFECT OF INTERIOR PARTITIONS ON RADIATION DOSE RATE IN A MULTISTORY WINDOWLESS BUILDING.
AD-402 685 DIV. 13

***RADIOBIOLOGY**

TRANSLATION OF FOREIGN RESEARCH: RADIATION INJURY MECHANISM IN MOUSE OVARIES: ELECTRICAL STIMULATION OF THE HEART BY RADIOFREQUENCY IMPULSE TRANSMISSION.
AD-402 519 DIV. 16

***RADIOFREQUENCY PULSES**
ELECTRIC DISCHARGES

EFFORTS TO OBTAIN SUPER RANGE RESOLUTION RADAR LEADS TO A STUDY OF MICROWAVE BREAKDOWN AT PULSE WIDTHS BELOW 20 NANOSECONDS.
AD-403 458 DIV. 8

***RADIOMETERS**
MATHEMATICAL ANALYSIS

APPLICATIONS OF MICROWAVE RADIOMETRY TO DETECTION, GUIDANCE, AND NAVIGATION.
AD-402 618 DIV. 18

***RARE EARTH ELEMENTS**
ALLOYS

A FUNDAMENTAL INVESTIGATION OF THE ALLOYING BEHAVIOR OF THE RARE EARTH AND RELATED METALS.
AD-402 619 DIV. 17

***REACTION KINETICS**
CHEMICAL REACTIONS

PROJECT SQUID SEMI-ANNUAL PROGRESS REPORT ON FLUID MECHANICS, TRANSPORT AND TRANSFER PROCESSES, CHEMICAL KINETICS, AND COMBUSTION PHENOMENA.
AD-402 775 DIV. 10

***REACTION KINETICS**
CONDENSATION

FUNDAMENTALS OF THE KINETICS AND MECHANISMS OF CONDENSATION, PARTICULARLY OF HOMOGENEOUS NUCLEATION FROM THE VAPOR PHASE.
AD-403 456 DIV. 27

***RECOILLESS GUNS**
SPOTTING ROUNDS

METHOD FOR COMPUTING THE FIRST ROUND HIT PROBABILITY FOR AN ANTITANK WEAPON WITH SPOTTING RIFLE CONTROL.
AD-402 808 DIV. 22

***RECONNAISSANCE SATELLITES**
AERIAL RECONNAISSANCE

OPTIMIZATION OF SATELLITE RECONNAISSANCE USING DYNAMIC PROGRAMMING TECHNIQUES.
AD-402 810 DIV. 12

*RECOVERY VEHICLES
SHIELDING

TEST AND EVALUATION OF THREE SHIELDED-CAB ATR FORCE VEHICLES.
AD-402 748 DIV. 11

*RECTIFIERS
ELECTRONIC SWITCHES

RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
AD-403 152 DIV. 7

*REENTRY VEHICLES
HEAT SHIELDS

ANALYSIS OF THE EFFECT OF HETEROGENEOUS REACTION KINETICS ON THE COMBUSTION OF GRAPHITE AT THE STAGNATION REGION OF A BLUNT BODY IN HYPERSONIC FLOW.
AD-403 004 DIV. 9

*REENTRY VEHICLES
RADAR ECHO AREAS

PRODUCT ASSURANCE PROGRAM TECHNICAL REPORT FOR THE RADAR CROSS-SECTION REDUCTION OF REENTRY VEHICLES.
AD-402 807 DIV. 12

*REFRACTORY MATERIALS
MICROSTRUCTURE

MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE REFRACTORY OXIDES.
AD-403 345 DIV. 14

*REINFORCING MATERIALS
GLASS TEXTILES

PROGRESS REPORT: HIGH TEMPERATURE GLASS FIBER REINFORCED METALS.
AD-403 331 DIV. 14

*RELIABILITY

RELIABILITY INFERENCE.
AD-402 645 DIV. 15

*RELIABILITY (ELECTRONICS)
REPORTS

PROGRAM PLAN. RELIABILITY PROGRAM STATUS AND DATA REPORT - VOL. 2.
AD-403 484 DIV. 8

*RELIABILITY (ELECTRONICS)
TRANSISTORS

QUALITY ASSURANCE REQUIREMENTS FOR SEMICONDUCTOR DEVICES. CONFIDENCE LIMITS FOR THE SHAPE PARAMETER BETA OF THE WEIBULL DISTRIBUTION. OPERATING AND STORAGE LIFE FOR TRANSISTOR DEVICES.
AD-403 120 DIV. 8

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N139A GERMANIUM TRANSISTOR.
AD-403 125 DIV. 8

*RESEARCH PROGRAM ADMINISTRATION
WEAPON SYSTEMS

A TALK ON SOME SUGGESTED CHANGES IN R AND D STRATEGY, WITH IMPLICATIONS FOR CONTRACTING.
AD-402 992 DIV. 32

*RETINA
AMPHIBIANS

RESEARCH ON THE RELATION BETWEEN THE ELECTRORETINOGRAM (ERG) AND SINGLE CELL ACTIVITIES IN THE RETINA.
AD-402 961 DIV. 16

*RHENIUM
NUCLEAR PROPERTIES

THE NUCLEAR PROPERTIES OF RHENIUM.
AD-402 668 DIV. 20

*RIBBON PARACHUTES
MODEL TESTS

WIND TUNNEL STUDY OF PARACHUTE CLUSTERING.
AD-402 777 DIV. 1

*RIBONUCLEIC ACIDS
RADIOPROTECTIVE AGENTS

CORRELATIVE STUDY OF RNA CONTENT AND THE DEGREE OF RADIORESISTANCE OF CELLS IN VITRO.
AD-403 274 DIV. 18

*ROCKET CASES
ACOUSTIC PROPERTIES

ACOUSTIC ANALYSIS OF FILAMENT WOUND POLARIS CHAMBERS.
AD-402 893 DIV. 27

*ROCKET CASES
FILAMENT WOUND CONSTRUCTION

ACOUSTIC ANALYSIS OF FILAMENT WOUND POLARIS CHAMBERS.
AD-402 893 DIV. 27

*ROCKET CASES
MATERIALS

MATERIALS AND PROCESSES FOR PRODUCING LARGE-DIAMETER THIN-WALL MISSILE AND ROCKET MOTOR PROPERTIES.
AD-402 636 DIV. 17

*ROCKET CASES
STRETCH FORMING

CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES.
AD-403 459 DIV. 27

*ROCKET FLARES
PYROTECHNICS

PYROTECHNIC OUTSIDE WARNING SYSTEM (POWS): A LOW-COST OUTDOOR ALERT SYSTEM WHICH CAN PROVIDE INSTANT AUDIBLE AND VISUAL WARNING OF IMMINENT NUCLEAR ATTACK, DAY OR NIGHT.
AD-403 367 DIV. 18

*ROCKET MOTOR NOZZLES
CONDENSATION

FUNDAMENTALS OF THE KINETICS AND MECHANISMS OF CONDENSATION, PARTICULARLY OF HOMOGENEOUS NUCLEATION FROM THE VAPOR PHASE.
AD-403 456 DIV. 27

*ROCKET MOTORS (LIQUID PROPELLANT)

VIBRATION COMBUSTION IN LIQUID FUELED ROCKET ENGINES.
AD-402 909 DIV. 12

*ROCKET MOTORS (SOLID PROPELLANT)
NON-DESTRUCTIVE TESTING

INFRARED TECHNIQUES FOR NON-DESTRUCTIVE TESTING OF SOLID PROPELLANT ROCKET MOTOR BONDING CHARACTERISTICS.
AD-402 888 DIV. 30

*ROCKET PROPELLANT GRAINS
DEFORMATION

DEFORMATIONS AND STRESSES IN AXIALLY ACCELERATED CASE-BONDED SOLID PROPELLANT GRAINS OF FINITE LENGTH. DEFORMATION OF VISCOELASTIC CYLINDERS OF INFINITE LENGTH AND ARBITRARY CROSS SECTION UNDER AXIAL ACCELERATION LOADS.
AD-403 443 DIV. 10

*SALIVA
CORTICOSTEROID AGENTS

CORTICOSTEROIDS IN HUMAN PAROTID FLUID FOLLOWING ORAL HYDROCORTISONE USAGE.
AD-403 380 DIV. 18

*SAMPLING
MONTE CARLO METHOD

WORKING PAPER IN FIELD OF MATHEMATICAL STATISTICS.
AD-402 663 DIV. 15

*SAND
COMPRESSIVE PROPERTIES

THE ENERGY ABSORPTION CAPACITY OF GRANULAR MATERIALS IN ONE-DIMENSIONAL COMPRESSION. THEORETICAL APPROACH FOR PREDICTING THE STRESS - STRAIN BEHAVIOR OF DENSE SANDS PRIOR TO PARTICLE CRUSHING. EFFECT OF GRAIN CRUSHING ON THE BEHAVIOR OF SANDS.
AD-402 779 DIV. 14

*SATELLITE NETWORKS

PROGRAM TO OBTAIN AN OUTPUT OF TIMES WHERE A SATELLITE ENTERS AND LEAVES THE EARTH'S SHADOW.
AD-402 898 DIV. 30

COMPUTER PROGRAMMING DESIGN SPECIFICATIONS FOR MODIFICATIONS TO MULTICON.
AD-402 900 DIV. 30

PROGRAM ON COMPUTER UTILIZATION REPORTS WHICH USE PUNCHED CARDS AS INPUT AND GENERATE TIME UTILIZATION ON ALL COMPUTING EQUIPMENT.
AD-402 903 DIV. 30

*SATELLITE NETWORKS
SPACE SURVEILLANCE SYSTEMS

SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS.
AD-402 659 DIV. 30

SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS.
AD-402 662 DIV. 30

*SATELLITES (ARTIFICIAL)
DETECTION

A COLLECTION OF REPORTS ON SATELLITE PLASMA SHEATH ANOMALIES.
AD-403 287 DIV. 12

*SATELLITES (ARTIFICIAL)
FLIGHT SIMULATORS

SATRAN, SIMULATOR DESIGN AND DESCRIPTION.
AD-402 684 DIV. 12

*SATELLITES (ARTIFICIAL)
PLASMA PHYSICS

A COLLECTION OF REPORTS ON SATELLITE PLASMA SHEATH ANOMALIES.
AD-403 287 DIV. 12

*SCATTERING
MATHEMATICAL ANALYSIS

ANGULAR SCATTERING DIAGRAMS CONSTRUCTED FOR SPHERICAL APHOSOLS OF REFRACTIVE INDEX N + 1.5.
AD-402 803 DIV. 25

*SCHEDULING
MATHEMATICAL ANALYSIS

A MATHEMATICAL FORMULATION AND SOLUTION OF A MULTIPLE-RESOURCE SCHEDULING PROBLEM.
AD-403 342 DIV. 18

*SCIENTIFIC RESEARCH

QUARTERLY PROGRESS REPORT ON A CONTINUING RESEARCH PROGRAM OF A NAVAL ORDNANCE LABORATORY.
AD-402 788 DIV. 30

*SCIENTIFIC RESEARCH
SCIENTIFIC ORGANIZATIONS

TRENDS IN SCIENTIFIC RESEARCH IN 1963 IN AFFILIATES OF ACADEMY OF SCIENCES USSR.
AD-402 516 DIV. 26

*SEALS (STOPPERS)
CERAMIC MATERIALS

CERAMIC TO METAL SEALS FOR HIGH TEMPERATURE THERMIONIC CONVERTERS. MANUFACTURING TECHNIQUES.
AD-402 679 DIV. 24

*SEDIMENTATION
STRATIGRAPHY

INVESTIGATIONS BY VARIOUS WORKERS ON SEDIMENTATION AND ENVIRONMENTS OF DEPOSITION IN THE CARTHAGE AND CAMPECHE TANK REGION.
AD-403 128 DIV. 2

*SEISMIC WAVES

DEVELOPMENT OF AN ANALOG COMPUTING TECHNIQUE FOR MEASURING TIME-VARYING POWER SPECTRA OF SEISMIC SIGNALS.
AD-403 084 DIV. 2

*SEISMIC WAVES
REFRACTION

OCEANOGRAPHIC VESSEL R/V CRUISE 203 WHICH INCLUDED ECHO-SOUNDING SURVEY, SCATTERING LAYER OBSERVATIONS AND SEISMIC REFRACTION STUDIES.
AD-403 141 DIV. 2

*SEISMOGRAPHS
ANALOG COMPUTERS

DEVELOPMENT OF AN ANALOG COMPUTING TECHNIQUE FOR MEASURING TIME-VARYING POWER SPECTRA OF SEISMIC SIGNALS.
AD-403 084 DIV. 2

*SEMICONDUCTING FILMS
SEMICONDUCTOR DEVICES

FABRICATION OF INSULATED GATE THIN-FILM TRANSISTORS USING CDS, AND CDSE THIN FILMS. A NOVEL TYPE OF FIELD EFFECT DIODE IS DESCRIBED.
AD-402 887 DIV. 8

*SEMICONDUCTING FILMS
VAPOR PLATING

CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
AD-403 053 DIV. 8

*SEMICONDUCTOR DEVICES
CRYSTAL RECTIFIERS

RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
AD-403 152 DIV. 7

*SEMICONDUCTOR DEVICES
MODULES (ELECTRONIC)

INVESTIGATION AND PRODUCTION OF MICRO-MODULES

FOR A MILLIMICROWAVE VERSION OF THE SYNCHRO-SYNCHRONOUS RECEIVER AND HAND-HELD TRANSMITTER, AND MICRO-PAC DIGITAL COMPUTER.
AD-402 739 DIV. P

**•SEMICONDUCTOR DEVICES
RADIATION DAMAGE**

TRANSIENT RADIATION EFFECTS ON ELECTRONIC COMPONENTS AND SEMICONDUCTOR DEVICES.
AD-403 117 DIV. P

**•SEMICONDUCTOR DEVICES
VARIABLE CAPACITORS**

HIGH Q VARACTOR DIODE DEVELOPMENT.
AD-403 455 DIV. P

**•SEMICONDUCTORS
IMPURITIES**

ASSOCIATION OF IMPURITY LEVELS WITH VERY LONG LIFETIMES WITH SUBSIDIARY MINIMA FOR A COULOMB IMPURITY POTENTIAL.
AD-402 925 DIV. 25

**•SENSORY MECHANISMS
MATHEMATICAL MODELS**

PATTERN-PERCEIVING, AND LEARNING NETWORKS; NETWORKS FOR REJECTING PATTERNED INPUT; AND OUTPUTS; COMPUTER MODEL OF SENSORIMOTOR DEVELOPMENT; MATHEMATICAL THEORY OF SENSORIMOTOR ORGANIZATION AND PERCEPTION.
AD-403 494 DIV. 28

•SEQUENCES

THE AUTOCORRELATION AND JOINT DISTRIBUTION FUNCTIONS OF A PAIR OF NEWSPACES.
AD-402 790 DIV. 15

•SERIES

DUAL SERIES RELATIONS AS MATHEMATICAL PHYSICS.
AD-402 694 DIV. 15

**•SERVOMECHANISMS
TEST EQUIPMENT**

DEVELOPMENT OF A FILTER NETWORK TO OPERATE BETWEEN THE AIRFRAME COMPUTER AND THE SERVO SYSTEM OF A DYNAMIC SIMULATOR PLATFORM FOR HELICOPTER TESTING TO SIMULATE UNLIMITED VARIATIONS ON THE LIMITED MOTIONS OF THE DYNAMIC PLATFORM.
AD-403 375 DIV. P

**•SHELTERS
RADIOACTIVE FALLOUT**

EFFECT OF INTERIOR PARTITIONS ON RADIATION DOSE RATE IN A MULTISTORY RINGLESS BUILDING.
AD-402 685 DIV. 19

**•SHIP HULLS
MOMENTS**

CALCULATED NATURAL VERTICAL HULL FREQUENCIES AND NORMAL MODES OF SURVEYING SHIP AGS 29.
AD-403 480 DIV. 31

**•SHIP HULLS
VIBRATION**

CALCULATED NATURAL VERTICAL HULL FREQUENCIES AND NORMAL MODES OF SURVEYING SHIP AGS 29.
AD-403 480 DIV. 31

**•SHOCK TUBES
DESIGN**

SHOCK TUBE FOR PRODUCING SUBSONIC, TRANSONIC, AND SUPERSONIC FLOW FOR AERODYNAMIC TESTING.
AD-403 045 DIV. 30

**•SHOCK WAVES
INTENSITY**

MEASUREMENT OF STRESSES OF A SHOCK WAVE PROPAGATED THROUGH THE SOIL (PRINCIPALLY CLAY).
AD-402 753 DIV. 2

**•SHROUDED PROPELLERS
STABILITY**

THEORETICAL INVESTIGATION OF DYNAMIC STABILITY DERIVATIVES OF DUCTED PROPELLERS.
AD-403 148 DIV. 9

**•SILICONE PLASTICS
MOISTUREPROOFING**

RAIN REPELLENT. SILICON-TITANIUM COPOLYMERS PASTE AND LIQUID CATALYST. RE-EVALUATION OF SURFACE ACTIVE AGENTS IN CONJUNCTION WITH DIMETHYLDIETHOXYSILANE.
AD-402 667 DIV. 4

**•SIMULATION
TRAINING**

OPERATIONS RESEARCH IN PRODUCTION OF SYSTEM TRAINING EXERCISES.
AD-402 624 DIV. 30

**•SINGLE CRYSTALS
DEFORMATION**

ULTRASONIC METHODS IN THE STUDY OF FATIGUE AND DEFORMATION IN SINGLE CRYSTALS OF ALUMINUM AND SODIUM CHLORIDE.
AD-403 284 DIV. 25

**•SINTERING
CORUNDUM**

A BOOK THAT DISCLOSES THE PROPERTIES AND METHODS OF PREPARING SINTERED CORUNDUM THAN5-
AD-402 580 DIV. 17

**•SINTERING
POWDER METALS**

RESULTS OF SINTERING STUDIES ON ATOMIZED AND SYNTHESIZED ALLOY POWDERS; OPTIMUM SINTERING CONDITIONS DEFINED.
AD-402 780 DIV. 17

**•SKIN
TEMPERATURE**

THE HYPOTHALAMIC AND SKIN TEMPERATURES IN CONTROLLING THE THERMAL RESPONSE OF A RESTING ANIMAL.
AD-402 758 DIV. 16

•SKY BRIGHTNESS

BRIGHTNESS OF THE SKY IN THE VICINITY OF THE SUN.
AD-403 103 DIV. 2

**•SMOKE MUNITIONS
EXPERIMENTAL DATA**

SURVEY OF RECENT INVESTIGATION OF PLASTIC-BONDED AND CASTABLE SMOKE COMPOSITIONS.
AD-403 099 DIV. 9

**•SMOKE PROJECTILES
ROCKET ASSISTED PROJECTILES**

PYROTECHNIC OUTSIDE WARNING SYSTEM (POWS)I A LOW-COST OUTDOOR ALERT SYSTEM WHICH CAN PROVIDE INSTANT AUDIBLE AND VISUAL WARNING OF IMMINENT NUCLEAR ATTACK, DAY OR NIGHT.
AD-403 367 DIV. 18

**•SOIL MECHANICS
STRAIN GAGES**

DEVELOPMENT OF A SMALL STRAIN GAGE FOR THE MEASUREMENT OF STATIC AND DYNAMIC STRAINS WHEN EMBEDDED IN SOIL SAMPLES.
AD-402 706 DIV. 2

**•SOILS
ANALYSIS**

SOIL MOISTURE DATA FOR ITHACA, NEW YORK AREA.
AD-402 963 DIV. 2

**•SOILS
MECHANICAL PROPERTIES**

RAPID EMPLACEMENT AND RETRIEVING DEVICE FOR PROBING STAKES CP-1170/G AND CP-1171/G.
AD-402 789 DIV. 30

**•SOILS
NEUTRON FLUX**

NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR NEVADA TEST SITE SOIL.
AD-403 371 DIV. 20

**•SOILS
STRESSES**

MEASUREMENT OF STRESSES OF A SHOCK WAVE PROPAGATED THROUGH THE SOIL (PRINCIPALLY CLAY).
AD-402 753 DIV. 2

**•SOLAR CELLS
FEASIBILITY STUDIES**

CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
AD-403 053 DIV. 8

**•SOLAR CELLS
SILICON**

HIGH EFFICIENCY SOLAR CELLS FOR TERRESTRIAL USE. CONCENTRATED SUNLIGHT MEASUREMENTS. SERIES RESISTANCE EFFECTS AND GRID OPTIMIZATION. COST FACTORS.
AD-402 838 DIV. 7

**•SOLAR DISTURBANCES
CLASSIFICATION**

STUDY OF DISTRIBUTION AND CLASSIFICATION OF SOLAR PROMINENCES.
AD-402 858 DIV. 2

**•SOLAR RADIATION
MEASUREMENT**

HIGH EFFICIENCY SOLAR CELLS FOR TERRESTRIAL USE. CONCENTRATED SUNLIGHT MEASUREMENTS. SERIES RESISTANCE EFFECTS AND GRID OPTIMIZATION. COST FACTORS.
AD-402 838 DIV. 7

**•SOLID ROCKET PROPELLANTS
DEFORMATION**

DEFORMATIONS AND STRESSES IN AXIALLY ACCELERATED CASE-BONDED SOLID PROPELLANT GRAINS OF FINITE LENGTH. DEFORMATION OF VISCOELASTIC CYLINDERS OF INFINITE LENGTH AND ARBITRARY CROSS SECTION UNDER AXIAL ACCELERATION LOADS.
AD-403 443 DIV. 10

•SOLID STATE PHYSICS

TRANSLATIONS OF RUSSIAN ARTICLES ON SOLID PHYSICS.
AD-402 522 DIV. 25

**•SOLID STATE PHYSICS
IMPURITIES**

ASSOCIATION OF IMPURITY LEVELS WITH VERY LONG LIFETIMES WITH SUBSIDIARY MINIMA FOR A COULOMB IMPURITY POTENTIAL.
AD-402 925 DIV. 25

**•SOLIDIFIED GASES
PREPARATION**

TECHNIQUE FOR SOLIDIFYING HYDROGEN AND NEON; PROTOTYPE MODEL PRESSURE-CONTROL VALVE.
AD-403 445 DIV. 19

**•SOLIDS
CHEMICAL REACTIONS**

REACTIONS IN MIXTURES OF SOLIDS. REACTION MECHANISMS AND THERMODYNAMICS. APPLICATIONS IN CERAMICS, REFRACTORIES AND CEMENTS. TRANSLATION OF RUSSIAN BOOK.
1
AD-402 799 DIV. 4

**•SONAR PERSONNEL
PERFORMANCE TESTS**

IMPROVEMENT IN SONAR-OPERATOR DETECTION PERFORMANCE CONSEQUENT TO THE USE OF OPTIMUM BIAS AND GAIN.
AD-403 029 DIV. 28

**•SONAR PERSONNEL
RELIABILITY**

IMPROVEMENT IN SONAR OPERATOR DETECTION PERFORMANCE CONSEQUENT TO THE USE OF OPTIMUM BIAS AND GAIN.
AD-403 029 DIV. 28

**•SPACE COMMUNICATION SYSTEMS
COMMUNICATION SATELLITES (PASSIVE)**

EXPANSION OF INTERIM SIMPLEX SPACE COMMUNICATION FACILITIES AT ROME, N. Y. AND TRINIDAD TO FULL DUPLEX FOR USE IN PASSIVE SATELLITE COMMUNI-
AD-402 834 DIV. 5

**•SPACE MEDICINE
INSTRUMENTATION**

SOVIET BIOMEDICAL MONITORING IN SPACE FLIGHT; METHODS, TECHNIQUES, AND EQUIPMENT. ELEVEN ARTICLES.
AD-402 620 DIV. 16

**•SPACE MEDICINE
MEDICAL EQUIPMENT**

A DIGITAL READOUT TECHNIC APPLICABLE TO LABORATORY AND AEROSPACE MEDICAL MONITORING OF PHYSIOLOGICAL DATA.
AD-403 481 DIV. 16

**•SPACE PROBES
PAYLOAD**

GUIDE TO PAYLOAD PLANNING FOR THE SLV-1B SPACE PROBE.
AD-402 767 DIV. 12

**•SPACE SURVEILLANCE SYSTEMS
PROGRAMMING (COMPUTERS)**

A PROGRAM ROUTINE TO PREPARE FLIGHT SUPPORT DATA PACKAGE TAPES FOR VEHICLES WHICH CARRY PROGRAMMABLE ORBITAL TIMERS.
AD-402 660 DIV. 30

INTRODUCTION TO THE SATELLITE CONTROL FACILITY'S COMPUTER PROGRAM SYSTEMS MANUAL.
AD-402 661 DIV. 30

*SPACECRAFT
AUXILIARY POWER PLANTS

FEASIBILITY OF SUBSTITUTING FLUID FILM BEARINGS FOR CONVENTIONAL ROLLING-ELEMENT TYPE BEARINGS IN SPACECRAFT AUXILIARY POWER ACCELERATORS.
AD-402 735 DIV. 7

*SPECTROSCOPY
EMISSIVITY

DESIGN OF A ROCKET-BORNE INFRARED SPECTROMETER.
AD-402 605 DIV. 25

*SPECTRUM ANALYZERS

IMPROVED HIGH MASS RANGE RESOLUTION WITH AN OMEGATRON MASS SPECTROMETER.
AD-402 906 DIV. 25

*SPEECH RECOGNITION
DIAGNOSIS

THE N. U. AUDITORY TEST (MONO 4) A TEST FOR SPEECH DISCRIMINATION COMPOSED OF CNC MONOSYLLABIC WORDS.
AD-403 275 DIV. 14

*SPINAL COLUMN
MEASUREMENT

HEISTIC CHARACTERS OF FISHES GIVE ACCOUNT OF THE THERMAL HISTORY DURING EARLY DEVELOPMENT.
AD-402 754 DIV. 14

*STALLING
SAFETY DEVICES

EMERGENCY CONTROL OF BOUNDARY LAYER ON AIRCRAFT WINGS BY PROPELLANT ENERGY.
AD-402 610 DIV. 1

*STATISTICAL ANALYSIS
PROBABILITY

A 2-PLAYER N-REGION SEARCH GAME.
AD-402 914 DIV. 14

*STATISTICAL DISTRIBUTIONS

ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT.
AD-402 608 DIV. 1

*STATISTICAL FUNCTIONS

ERROR SUM OF SQUARES UNDER COMPLETE AND CONSTRAINED APPROXIMATION.
AD-402 644 DIV. 17

*STATISTICAL PROCESSES
PROBABILITY

PROBABILISTIC PROPERTIES OF MODULAR CIRCUITS.
AD-403 466 DIV. 9

*STATISTICAL PROCESSES
PROGRAMMING (COMPUTERS)

A STOCHASTIC PROCESS METHOD (SPM) FOR NEUTRON PROBLEMS AND A COMPUTER PROGRAM FOR THE METHOD.
AD-403 485 DIV. 20

*STEEL
EXTRUSION

DEVELOPMENT OF AN IMPROVED EXTRUSION PROCESS FOR PRODUCING ULTRA-THIN AIRFRAME - QUALITY STEEL EXTRUSIONS. INTERIM REPORT.
AD-403 357 DIV. 20

*STEEL
METAL SPINNING

MATERIALS AND PROCESSES FOR PRODUCING LARGE-DIAMETER THIN-WALL MISSILE AND ROCKET MOTOR COMPONENTS.
AD-402 636 DIV. 17

*STORAGE BATTERIES
AMMONIA

RESEARCH ON AMMONIA BATTERY SYSTEM. MULTICELL UNITS. HASTELLOY CORROSION STUDY. COLD ACTIVATION PROBLEM. LOW RATE AND SCREENING TESTS AC IMPEDANCE MEASUREMENTS.
AD-402 683 DIV. 7

*STORAGE BATTERIES
MATERIALS

NEW CATHODE-ANODE COUPLES FOR SECONDARY BATTERIES USING MOLTEN SALT ELECTROLYTES.
AD-402 884 DIV. 7

*STRAIN GAGES
CALIBRATION

MEASUREMENT OF STRESSES OF A SHOCK WAVE PROPAGATED THROUGH THE SOIL (PRINCIPALLY CLAY).
AD-402 753 DIV. 2

*STRAIN GAGES
DESIGN

DEVELOPMENT OF A SMALL STRAIN GAGE FOR THE MEASUREMENT OF STATIC AND DYNAMIC STRAINS WHEN EMBEDDED IN SOIL SAMPLES.
AD-402 706 DIV. 2

*STRATEGIC AIR COMMAND

SIMPLIFIED QUEUEING MODEL FOR THE WOSL SYSTEM.
AD-402 626 DIV. 18

*STRATOSPHERE
CLIMATOLOGY

THE KINETIC-ENERGY BUDGET OF THE STRATOSPHERE OVER NORTH AMERICA DURING THE WARMING OF 1957.
AD-403 471 DIV. 2

*STRESS (PHYSIOLOGY)
HEAT TOLERANCE

MEASUREMENT OF PERFORMANCE CHANGES IN HIGHLY TRANSIENT EXTREME HEAT STRESS. RATIONALE, PROBLEMS, AND EXPERIMENTAL PROCEDURES.
AD-402 913 DIV. 14

*STRESSES
SOLID ROCKET PROPELLANTS

DEFORMATIONS AND STRESSES IN AXIALLY ACCELERATED CASE-BONDED SOLID PROPELLANT GRAINS OF FINITE LENGTH. DEFORMATION OF VISCOELASTIC CYLINDERS OF INFINITE LENGTH AND ARBITRARY CROSS SECTION UNDER AXIAL ACCELERATION LOADS.
AD-403 443 DIV. 10

*STRETCH FORMING
ROCKET CASES

CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES.
AD-403 459 DIV. 27

*SUBMARINES
MACHINES

ANALYSIS TECHNIQUES FOR SUBMARINE MACHINERY INSTALLATIONS BY MECHANICAL IMPEDANCE METHODS.
AD-403 440 DIV. 31

*SUPERCONDUCTIVITY
THEORY

RULES FOR THE OCCURRENCE OF SUPERCONDUCTIVITY AMONG THE ELEMENTS, ALLOYS, AND COMPOUNDS. MATTHIAS RULE OF SUPERCONDUCTIVITY.
AD-402 708 DIV. 25

*SUPERSONIC FLOW

HEAT TRANSMISSION AND SUPERSONIC FLOW; TRANSLATIONS OF ARTICLES IN RUSSIAN JOURNALS.
AD-402 596 DIV. 9

*SURGERY
MEDICAL EQUIPMENT

SCIENTIFIC AND TECHNICAL INFORMATION ON NORTH VIETNAM - TRANSLATIONS.
AD-402 517 DIV. 7

*SWITCHING CIRCUITS
DIODES (SEMICONDUCTOR)

INFORMATION PRESENTED ON TRI INVERTER CIRCUITS, 1400 VA AND 900/25 VA, EMPLOYING SILICON CONTROLLED RECTIFIERS AS SWITCHING DEVICES.
AD-402 939 DIV. 8

*SYMPOSIA
CYBERNETICS

SIGNIFICANCE OF CYBERNETICS IN SCIENCE, TECHNOLOGY AND ECONOMY IN THE GERMAN DEMOCRATIC REPUBLIC. CONFERENCE OF THE CYBERNETICS COMMISSION HELD BY THE SECRETARY GENERAL OF THE GERMAN ACADEMY OF SCIENCES, OCT 1962. TRANSLATION.
AD-402 520 DIV. 30

*SYNTHETIC RUBBER
METEOROLOGICAL BALLOONS

PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
AD-402 700 DIV. 1

*TANKERS
COSTS

FIRST ORDER ESTIMATE OF DISPLACEMENT AND COST OF TANKERS AND DRY CARGO SHIPS AS A FUNCTION OF PAYLOAD, SPEED AND RANGE.
AD-403 336 DIV. 31

*TANKERS
WEIGHT

FIRST ORDER ESTIMATE OF DISPLACEMENT AND COST OF TANKERS AND DRY CARGO SHIPS AS A FUNCTION OF PAYLOAD, SPEED AND RANGE.
AD-403 336 DIV. 31

*TANTALUM
TRANSITION TEMPERATURE

THE MECHANICAL PROPERTIES OF TANTALUM WITH SPECIAL REFERENCE TO THE DUCTILE-BRITTLE TRANSITION.
AD-403 074 DIV. 17

*TARGETS
DETECTION

APPLICATIONS OF MICROWAVE RADIOMETRY TO DETECTION, GUIDANCE, AND NAVIGATION.
AD-402 618 DIV. 19

*TEACHING MACHINES
ELECTRONICS

A PROTOTYPE, AUTOMATED TECHNICAL TRAINING COURSE IN COMMUNICATIONS ELECTRONICS PRINCIPLES.
AD-402 732 DIV. 23

*TELEMETERING TRANSMITTERS
VERY HIGH FREQUENCY

SPECTRUM UTILIZATION REQUIREMENTS OF A VHF/FM TELEMETERING TRANSMITTER WERE DETERMINED TO FACILITATE THE ASSIGNMENT OF FREQUENCIES ON AN INTERFERENCE FREE BASIS.
AD-402 928 DIV. 8

*TELESCOPES
RADIO EQUIPMENT

A GIANT RADIO TELESCOPE IN SERPUKHOV, USSR.
AD-402 586 DIV. 2

*TENSILE PROPERTIES
STATISTICAL ANALYSIS

PRESENTS THEORETICAL AND EXPERIMENTAL STATISTICAL ANALYSIS OF THE RANDOM RESPONSE OF A CONTINUOUS BAR IN TENSION.
AD-402 825 DIV. 15

*TERRESTRIAL MAGNETISM
ANOMALIES

MAGNETIC ANOMALIES CAUSED BY TWO-DIMENSIONAL STRUCTURES; THEIR COMPUTATION BY DIGITAL COMPUTERS AND THEIR INTERPRETATION.
AD-402 696 DIV. 2

*TEST EQUIPMENT
HELICOPTERS

DEVELOPMENT OF A FILTER NETWORK TO OPERATE BETWEEN THE AIRFRAME COMPUTER AND THE SERVO SYSTEM OF A DYNAMIC SIMULATOR PLATFORM FOR HELICOPTER TESTING TO SIMULATE UNLIMITED VARIATIONS OF THE LIMITED MOTIONS OF THE DYNAMIC PLATFORM.
AD-403 375 DIV. 8

*TEST FACILITIES
ANTENNAS

THE GENERAL REQUIREMENTS AND LAYOUT OF AN ANTENNA TEST RANGE ARE DESCRIBED TO INCLUDE FACILITY CONSTRUCTION PLANS AND INSTRUMENTATION.
AD-402 682 DIV. 8

*TEST METHODS
ULTRASONIC RADIATION

EFFORT WAS EXPENDED TO DETERMINE THE EFFECTS OF SEVERAL METALLURGICAL AND ACOUSTICAL VARIABLES ON THE ULTRASONIC SIGNAL STRENGTH USING COMMERCIALLY AVAILABLE ULTRASONIC FLAW DETECTING EQUIPMENT.
AD-402 823 DIV. 30

*TETRODES
S BAND

RESEARCH ON A CERAMIC TETRODE CAPABLE OF 40 WATTS AT 3000 MC.
AD-402 655 DIV. 8

*TEXTBOOKS

A BOOK THAT DISCLOSES THE PROPERTIES AND METHODS OF PREPARING SINTERED CORUNDUM TRANS-
AD-402 580 DIV. 17

***THALAMUS**
STIMULATION

MEDICAL RESEARCH ON THE ROLE OF THALAMIC AND PERICIRCULAR STIMULATION UPON THE FREQUENCY RESPONSE ACTIVITIES OF THE GENERATOR OF ELECTROENCEPHALOGRAM AND HYPNOGRAM.
AD-403 118 DIV. 16

***THALAMUS**
TEMPERATURE

THE HYPOTHALAMIC AND SKIN TEMPERATURES IN CONTROLLING THE THERMAL RESPONSE OF A RESTING ANIMAL.
AD-402 758 DIV. 16

***THERMAL CONDUCTIVITY**
MELTING

UPPER AND LOWER BOUNDS IN PROBLEMS OF MELTING OR SOLIDIFYING SLABS.
AD-402 809 DIV. 25

***THERMAL STRESSES**
BIBLIOGRAPHIES

ANNOTATED BIBLIOGRAPHY ON THERMAL SHOCK: 1954 TO 1960.
AD-403 469 DIV. 25

***THERMIONIC CONVERTERS**
CATHODES (ELECTRON TUBES)

STUDY OF THE IMPROVEMENT OF THE EFFICIENCY OF THERMIONIC CONVERTERS. MAKING OF NON-PLANAR SURFACE CHARACTERISTICS.
AD-402 697 DIV. 8

***THERMIONIC CONVERTERS**
DESIGN

THERMIONIC CONVERTER MODULE FOR LIQUID METAL HEATING.
AD-402 815 DIV. 7

***THERMIONIC CONVERTERS**
ELECTRODES

DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
AD-402 639 DIV. 7

EXPERIMENTAL PROGRAM ON EMITTER MATERIALS TO DETERMINE THEIR POTENTIAL FOR USE IN LOW-TEMPERATURE, THERMIONIC ENERGY CONVERTERS.
AD-403 362 DIV. 8

***THERMIONIC CONVERTERS**
SEALS (STOPPERS)

CERAMIC TO METAL SEALS FOR HIGH TEMPERATURE THERMIONIC CONVERTERS. MANUFACTURING TECHNIQUES.
AD-402 679 DIV. 24

***THERMODYNAMICS**

A DIABATIC WEATHER PREDICTION MODEL WITH A CONSISTENT ENERGY INTEGRAL.
AD-403 461 DIV. 2

***THRUST BEARINGS**
ELECTRIC MOTORS

DEVELOPMENT OF GAS LUBRICATED JOURNAL AND THRUST BEARINGS FOR ELOWER MOTORS.
AD-402 686 DIV. 24

***TIME LAG THEORY**

SIMPLIFIED QUEUEING MODEL FOR THE NOSL SYSTEM.
AD-402 626 DIV. 19

***TIN**
ISOTOPE SEPARATION

A RAPID RADIOCHEMICAL PROCEDURE FOR TIN.
AD-403 022 DIV. 20

***TISSUE CULTURE**
THERMAL STRESSES

THERMAL STRESS ON THE MORPHOLOGY AND PHYSIOLOGY OF MOUSE KIDNEY CELLS IN CULTURE.
AD-402 905 DIV. 16

***TISSUES (BIOLOGY)**
TRANSPLANTATION

MUTUALLY TOLERANT HOST AND DONOR TYPE IMMUNOLOGICALLY COMPETENT CELLS IN MOUSE RADIATION CHIMERAS.
AD-403 271 DIV. 16

***TOWING VEHICLES**
SHIELDING

TEST AND EVALUATION OF THREE SHIELDED-CAB AIR FORCE VEHICLES.
AD-402 748 DIV. 11

***TRACKING**
FUNCTIONS

A COMPARISON BETWEEN TRACKING WITH "OPTIMUM" DYNAMICS AND TRACKING WITH A SIMPLE VELOCITY CONTROL.
AD-402 843 DIV. 28

***TRACKING**
PERFORMANCE TESTS

UPPER EXTREMITY PROSTHETICS RESEARCH. THE PERFORMANCE OF HUMAN OPERATORS OF TRACKING SYSTEMS.
AD-403 402 DIV. 16

***TRACKING**
TRAINING

A DIFFERENTIAL INFLUENCE OF AUGMENTED FEEDBACK ON LEARNING AND ON PERFORMANCE.
AD-402 973 DIV. 23

***TRAINING**
FEEDBACK

A DIFFERENTIAL INFLUENCE OF AUGMENTED FEEDBACK ON LEARNING AND ON PERFORMANCE.
AD-402 973 DIV. 23

***TRANSFORMERS**
AUDIOFREQUENCY

HIGH POWER, HIGH VOLTAGE, AUDIOFREQUENCY TRANSFORMERS, DESIGN METHODS AND TEST DATA.
AD-403 400 DIV. 7

***TRANSISTORS**
DIFFUSION

CONTROLLED VARIATION OF DIFFUSED PHOSPHORUS CONCENTRATION FOR SILICON PNP TRANSISTORS.
AD-403 479 DIV. 8

***TRANSISTORS**
POWER SUPPLIES

DC TO DC POWER CONVERTER EMPLOYING TRANSISTORS AND A CERAMIC, PIEZOELECTRIC TRANSFORMER.
AD-402 885 DIV. 8

***TRANSISTORS**
PRODUCTION

COMPLETION OF THE FINAL DESIGN OF THE PILOT LINE, JET ETCH TRANSISTOR TYPE 2N501A IS REPORTED. EMITTER AND COLLECTOR LEAD WIRE EVALUATION, METALLOGRAPHIC SURFACE TREATMENT EVALUATION, BLACK PAINTING AS A FINAL FINISH.
AD-403 366 DIV. 8

***TRANSISTORS**
RELIABILITY (ELECTRONICS)

QUALITY ASSURANCE REQUIREMENTS FOR SEMICONDUCTOR DEVICES. CONFIDENCE LIMITS FOR THE SHAPE PARAMETER BETA OF THE WEIBULL DISTRIBUTION. OPERATING AND STORAGE LIFE FOR TRANSISTOR DEVICES.
AD-403 120 DIV. 8

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N139A GERMANIUM TRANSISTOR.
AD-403 125 DIV. 8

***TRANSISTORS**
SEMICONDUCTING FILMS

FABRICATION OF INSULATED GATE THIN-FILM TRANSISTORS USING CDS AND CDSE THIN FILMS. A NOVEL TYPE OF FIELD EFFECT DEVICE IS DESCRIBED.
AD-402 887 DIV. 8

***TRANSITION ELEMENTS**
THERMAL STRESSES

A CORRELATION IS ESTABLISHED FOR THE THERMAL COMPONENT OF THE YIELD STRESS OF THE BODY CENTERED CUBIC TRANSITION METALS IN GROUPS VA AND VIA OF THE PERIODIC TABLE.
AD-402 796 DIV. 17

***TRANSMISSION LINES**

PROPERTIES OF STRIP TRANSMISSION LINE.
AD-402 623 DIV. 8

***TRANSPORT PROPERTIES**
THERMODYNAMICS

PROJECT SQUID SEMI-ANNUAL PROGRESS REPORT ON FLUID MECHANICS, TRANSPORT AND TRANSFER PROCESSES, CHEMICAL KINETICS, AND COMBUSTION PHENOMENA.
AD-402 775 DIV. 10

***TRANSPORTATION**
URBAN AREAS

A TALK ON THE GENERAL PROBLEM OF URBAN TRANSPORTATION. INCLUDED IS A BIBLIOGRAPHY OF HARD PUBLICATIONS ON URBAN TRANSPORTATION.
AD-402 991 DIV. 33

***TRANSPORTS**
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, TCLBREAKERS, AND TUGS.
AD-403 060 DIV. 31

***TRAVELING WAVE TUBES**
MICROWAVE AMPLIFIERS

A MILLIMETER LOW-NOISE TRAVELING-WAVE AMPLIFIER.
AD-403 111 DIV. 8

***TRAVELING WAVE TUBES**
MULTIPLE OPERATION

EFFORTS TO DEVELOP A LOW-NOISE TRAVELING-WAVE TUBE WHICH FUNCTIONS SIMULTANEOUSLY AS A LINEAR X-BAND AMPLIFIER, LIMITER, VIDEO DETECTOR AND AMPLIFIER.
AD-402 670 DIV. 8

***TUGS**
VIBRATION

RESULTS OF VIBRATION TESTS OF VARIOUS MACHINERY AND STRUCTURES LOCATED ON CERTAIN AIRCRAFT CARRIERS, CRUISERS, DESTROYER ESCORTS, DESTROYERS, FRIGATES, PICKET SHIPS, OILERS, TCLBREAKERS, AND TUGS.
AD-403 060 DIV. 31

***TUNGSTEN**
DEFORMATION

THE DEFORMATION CHARACTERISTICS OF BERYLLIUM AND TUNGSTEN UNDER CONDITIONS OF HIGH HYDROSTATIC PRESSURE.
AD-403 188 DIV. 17

***TUNGSTEN**
HARDNESS

HARDNESS DETERMINATIONS OF TUNGSTEN AT TEMPERATURES FROM 20 TO 2700 C.
AD-402 600 DIV. 17

***TUNGSTEN**
POWDER METALLURGY

POWDER METALLURGY TUNGSTEN PLATE AND SHEET FROM PILOT POWDER AND MELT PROGRAMS.
AD-402 707 DIV. 17

***TUNGSTEN**
SURFACES

STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
AD-402 932 DIV. 25

***TUNGSTEN ALLOYS**
MANUFACTURING METHODS

VACUUM ARC MELTING OF TUNGSTEN + 0.6% COLUMBIUM ALLOY.
AD-403 394 DIV. 17

TUNGSTEN-BASE ALLOYS AND 8-3% MO-BASE ALLOYS CONTAINING NOMINALLY 1% HF, OR 0.05% ZR HAVE BEEN SUCCESSFULLY CONVERTED TO 1/2-INCH DIAMETER BAR STOCK BY EXTRUSION AND SWAGING OPERATIONS.
AD-403 434 DIV. 17

***TUNNEL DIODES**

FABRICATION OF HIGH - CURRENT GERMANIUM AND GALLIUM ARSENIDE TUNNEL DIODES: INTERIM DEVELOPMENT REPORT.
AD-403 482 DIV. 8

***TUNNEL DIODES**
MICROWAVE OSCILLATORS

ATTEMPTS TO DEVELOP A TUNNEL DIODE OSCILLATOR
AD-403 454 DIV. 8

***TURBOJET ENGINES**
MONITORS

DESIGN OF ENGINE PERFORMANCE INDICATOR FOR INTEGRATED DISPLAY SYSTEM FOR JET FIGHTERS.
AD-402 813 DIV. 1

***TURBULENCE**
ATMOSPHERE

EXPERIMENTAL INVESTIGATION OF THE ENERGY SPECTRUM OF ATMOSPHERIC TURBULENCE.
AD-403 014 DIV. 9

***TURBULENT BOUNDARY LAYER**
HEAT TRANSFER

THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER IN HYPERSONIC FLOW.
AD-403 486 DIV. 9

*TURBULENT BOUNDARY LAYER
VELOCITY

MEAN VELOCITY DISTRIBUTION IN THE OUTER LAYER OF A TURBULENT BOUNDARY LAYER.
AD-403 496 DIV. 9

*TYPEWRITERS
DIGITAL COMPUTERS

A FLIGHT DATA PROCESSING SYSTEM WAS DEVELOPED WHICH PERMITS THE COMPUTER TO ACCEPT AND PROCESS SIX DIFFERENT KINDS OF MESSAGES. COMPUTER ROUTINES FOR THE SYSTEM ARE PRESENTED.
AD-403 484 DIV. 30

*ULTRASONIC RADIATION
TEST METHODS

EFFORT WAS EXPENDED TO DETERMINE THE EFFECTS OF SEVERAL METALLURGICAL AND ACOUSTICAL VARIABLES ON THE ULTRASONIC SIGNAL STRENGTH USING COMMERCIALLY AVAILABLE ULTRASONIC FLAW DETECTION EQUIPMENT.
AD-402 823 DIV. 30

*ULTRAVIOLET SPECTROPHOTOMETERS

A TWO-CHANNEL, ROCKET-BORNE, EBERT GRATING INFRARED AND ULTRAVIOLET SPECTROMETER: DESIGN HISTORY AND THEORY OF OPERATION.
AD-402 611 DIV. 30

*UNDERGROUND EXPLOSIONS
BLAST

DIRECTLY-TRANSMITTED GROUND PHENOMENA FROM WEAPONS IN THE CLOSE-IN REGION.
AD-403 054 DIV. 2

*UNDERGROUND EXPLOSIONS
NUCLEAR EXPLOSIONS

DETERMINATION OF SEISMIC WAVE SHAPES EMITTED FROM AN UNDERGROUND NUCLEAR EXPLOSION.
AD-403 090 DIV. 2

*UNDERGROUND STRUCTURES
BLAST

BLAST LOADING OF SMALL BURIED ARCHES.
AD-403 113 DIV. 13

*UNDERGROUND STRUCTURES
DESIGN

BLAST LOADING OF SMALL BURIED ARCHES.
AD-403 113 DIV. 13

*UNDERGROUND STRUCTURES
EXPLOSION EFFECTS

A DESCRIPTION OF NUCLEAR WEAPON EFFECTS IN THE CLOSE-IN REGION TO PROVIDE THE DESIGNER OF PROTECTIVE CONSTRUCTION USEFUL INPUTS FOR STRUCTURAL ANALYSIS AND DESIGN.
AD-403 028 DIV. 20

APPENDICES TO FINAL REPORT ON UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION.
AD-403 073 DIV. 20

AIR-INDUCED EFFECTS AND DIRECTLY-TRANSMITTED EFFECTS OF NUCLEAR WEAPON SURFACE BURST ON UNDERGROUND STRUCTURES.
AD-403 123 DIV. 22

*UNDERGROUND STRUCTURES
TESTS

BLAST LOADING OF SMALL BURIED ARCHES.
AD-403 113 DIV. 13

*UNDERWATER EXPLOSIONS
EXPLODING WIRES

LOW-YIELD UNDERWATER EXPLOSION TANK AND ASSOCIATED INSTRUMENTATION.
AD-403 032 DIV. 22

*URANIUM COMPOUNDS
OXIDATION

TRANSLATION OF FOREIGN RESEARCH: THE OXIDATION OF URANIUM DIOXIDE.
AD-402 595 DIV. 6

*VENUS
EXTRATERRESTRIAL RADIO WAVES

MILLIMETER (8.35 MM) RADIO EMISSION FROM JUPITER AND VENUS.
AD-403 678 DIV. 8

*VENUS
VOLCANOES

VOLCANIC ACTIVITY ON VENUS: A DEDUCTION AFTER COMPARISON OF ABSORPTION SPECTRA OF KAMCHATKA VOLCANOES AND VENUS.
AD-402 594 DIV. 2

*VERTICAL TAKE-OFF PLANES
TILT WINGS

A SIMULATOR STUDY OF TILT-WING HANDLING QUALITIES.
AD-402 774 DIV. 1

*VIBRATION
BODIES OF REVOLUTION

DISCUSSION OF THEORY OF VIBRATION OF A PARABOLOIDAL SHELL OF REVOLUTION. RESULTS OF EXPERIMENTS ON TWO MODELS OF SUCH SHELLS.
AD-402 926 DIV. 25

*VISION
STIMULATION

MEDICAL RESEARCH ON THE ROLE OF THALAMIC AND RETICULAR FORMATION UPON THE FREQUENCY RESPONSE ACTIVITIES OF THE GENERATOR OF ELECTROENCEPHALOGRAM AND MYOTONOGRAM.
AD-403 118 DIV. 16

*WARNING SYSTEMS
ROCKET PROPULSION

PYROTECHNIC OUTSIDE WARNING SYSTEM (POWS): A LOW-COST OUTDOOR ALERT SYSTEM WHICH CAN PROVIDE INSTANT AUDIBLE AND VISUAL WARNING OF IMMINENT NUCLEAR ATTACK, DAY OR NIGHT.
AD-403 367 DIV. 18

*WATER
RADIATION EFFECTS

IONIZATION RADIATION EFFECTS ON AQUEOUS SOLUTIONS OF FORMIC AND OXALIC ACIDS: COBALT-60 GAMMA RAYS: REACTION SEQUENCES.
AD-403 358 DIV. 20

*WATER ENTRY
LANDING IMPACT

CONTINUING RESEARCH ON DEVELOPMENT OF A MORE ACCURATE METHOD FOR CALCULATING BODY-WATER IMPACT PRESSURES.
AD-402 698 DIV. 9

*WATER VAPOR
EMISSIVITY

* SPECTRAL EMISSIVITIES FOR WATER VAPOR AT 10U, 1200, 1500, 1800, AND 2230 K.
AD-403 392 DIV. 25

*WAVEGUIDES
ELECTRICAL PROPERTIES

A NEW WAVEGUIDE FOR THE LOW-LOSS TRANSMISSION OF MILLIMETER WAVES IS PRESENTED. THE GUIDE CONSISTS OF TWO PARALLEL CONDUCTING WALLS WITH GROOVES IN THE CENTRAL REGION OF THE GUIDE CROSS-SECTION.
AD-402 757 DIV. 8

*WEATHER STATIONS
MILITARY PERSONNEL

EVALUATION OF GRADUATES OF ATC COURSE AD-231231, APPRENTICE WEATHER OBSERVER.
AD-403 348 DIV. 23

*WEIGHTLESSNESS
LIQUEFIED GASES

A CAPILLARY-ACTION, LIQUID-OXYGEN CONVERTER FOR WEIGHTLESS ENVIRONMENT.
AD-402 751 DIV. 1

*WEIGHTLESSNESS
TRAINING

ZERO GRAVITY INDOCTRINATION FOR THE MERCURY-ATLAS ASTRONAUTS.
AD-402 786 DIV. 28

*WELDING
LOW PRESSURE RESEARCH

AN ANNOTATED BIBLIOGRAPHY ON COLD WELDING IN VACUUM COVERING THE YEARS 1953 TO 1962.
AD-403 441 DIV. 26

*WIND
ANALYSIS

"WIND, WIND SHEAR AND TURBULENCE PRESENTATION FOR ATMOSPHERIC BALLISTICS.
AD-403 114 DIV. 2

*WIND TUNNEL NOZZLES
DESIGN

MECHANICAL DESIGN OF A 50 IN. MACH 10-12 WIND TUNNEL.
AD-402 781 DIV. 30

*WINGS
LIFT

EMERGENCY CONTROL OF BOUNDARY LAYER ON AIRCRAFT WING BY PROPELLANT ENERGY.
AD-402 610 DIV. 1

*WORK FUNCTIONS
ELECTRODES

DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
AD-402 639 DIV. 7

*X-RAY DIFFRACTION ANALYSIS
SINGLE CRYSTALS

RESEARCH ON A SUITABLE DISPERSING OR ANALYZING CRYSTAL FOR X-RAY SPECTROSCOPY.
AD-403 492 DIV. 25

*X RAYS

MEASUREMENT OF RADIOACTIVITY IN ATMOSPHERE BY MEANS OF BALLOON EQUIPMENT.
AD-403 276 DIV. 20

*X RAYS
CHROMOSOMES

EFFECTS OF RADIATIONS ON CELL DIVISION.
AD-403 109 DIV. 16

*XENON
CHEMICAL COMPOUNDS

CHEMICAL REACTIONS OF OXYGEN FLUORIDES: SYNTHESIS OF XENON TETRAFLUORIDE BY ELECTRIC DISCHARGE: SYNTHESIS OF XENON OXYFLUORIDES AND KRYPTON TETRAFLUORIDE.
AD-403 447 DIV. 4

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-402 608 Div. 1
(TISTP/TL) OTS price $5.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ANALYSIS OF PROBABILITY DISTRIBUTIONS AND POWER SPECTRA OF TIME HISTORIES OF MANEUVERING FLIGHT,
by Charles B. Notess. 8 Dec 60, 52p. CAL 1428-F-1
Contract NOas60 6114

Unclassified report

Descriptors: *Flight, *Aircraft, *Airframes, *Probability, *Statistical distribution, Pitch (Motion), Roll, Yaw, Fatigue (Mechanics), Load distribution, Aerodynamic loading, Gust loads, Aerodynamic characteristics, Mathematical models, Motion, Stresses.

Time histories of representative maneuvering flight were used to compute the power spectral densities of pertinent aircraft motions. Peak distributions were also examined. The analysis has shown that the mission and the type of aircraft are the two most important factors which influence the probability of occurrence of peak motions. The spectral analysis has shown that the predominant frequencies present in maneuver motions, and which appear to be closely related to peaks in the time histories, are not necessarily the natural frequencies of rigid airframe response such as Dutch roll and short period. A statistical model representative of maneuvering motion time histories is briefly described. (Author)

AD-402 610 Div. 1, 9
(TISTA/GEC) OTS price $6.60

Pitman-Dunn Labs., Group, Frankford Arsenal, Philadelphia, Pa.
EMERGENCY CONTROL OF BOUNDARY LAYER ON AIRCRAFT WINGS BY PROPELLANT ENERGY,
by Agnew E. Larsen, C. J. Litz, Jr., David C. Hazen, and F. Carter Karins. Apr 63, 62p.
R1675
Task5 62

Unclassified report

Descriptors: *Boundary layer control systems, *Wings, *Stalling, Aviation safety, Time, Airfoils, Wind tunnel models, Model tests, Mathematical prediction, Energy, Transport planes, Short take-off planes, Gas generating systems, Design, Jet mixing flow, Cartridges (Pad), Lift, Safety devices.

Operating with the demonstrated and proven state-of-the-art of boundary layer phenomenon as related to airfoils, this project studies two objectives: the uses of safely stored propellant energy instantly released and directed through ducting, ejectors, and/or other means, to appropriately located apertures on the airfoil surfaces; and the reattachment of the circulation flow through ballistic-combustion-powered boundary layer control of the airflow over and around stalled airfoil test models. The preliminary research efforts were directed toward the study of acquisition of time interval data and was accomplished by recording and measuring the time interval required for decay of circulation flow with the breakdown of lift in stall, and the measurement of time for the reattachment of circulation flow in the restoration of lift. The expenditures of energy involved for restoration of circulation flow were also recorded and measured. These values of transient energy were subsequently utilized in computations to determine the propellant energy requirements for full scale application of these emergency boundary layer control concepts on the U. S. Army Caribou airplane. (Author)

AD-402 692 Div. 1
(TISTA/GEC) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 34, 1-31 Mar 63,
by C. V. Lassmann. 8 Apr 63, 4p.
Contract NOw60 0060c

Unclassified report

Descriptors: *Aeronautical booms, Flight testing, Aerodynamic characteristics, Jet fighters, Attack bombers, Naval aircraft, Jet bombers, Aircraft protuberances, Refueling-in-flight.

Navy flight tests were conducted on the Beech Model 385 Air Refueling Store on the F-4 aircraft. Stowed flight up to Mach 1.1 was achieved satisfactorily during ferry flight of the store to Patuxent. Three operational flights were accomplished at NATC with only partial success. Satisfactory extend/retract function occurred at 250 kt, however, cable system malfunctions were encountered at 300 kt. Satisfactory engagements were achieved by an A-4 receiver, however, difficulties were encountered with the F-8. Fuel transfer was satisfactory with the F-8 but unsuccessful with the A-4. (Author)

AD-402 700 Div. 1, 14
(TISTM/EJH) OTS price $22.25

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Final rept., 25 Apr 60-21 Dec 62,
by Eric Nelson and Herman Newstein. 21 Dec 62, 429p.
Contracts DA36 039sc84925 and Projs. 3A99 07 001 08 3M36 21 001 04

Unclassified report

Descriptors: *Meteorological balloons, *Films, *Polymers, *Synthetic rubber, Plasticizers, Elastomers, High altitude, Mechanical properties, Tensile properties, Radiation damage, Ultraviolet radiation, Infrared radiation, Configuration, Ozone, Antioxidants, Catalysts, Stresses, Materials.

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

Contents:
Study of balloon films and their effect on balloon flight performance: Study of the literature; Study of raw materials; Development of formulations with desirable film properties; High-altitude balloon compounds; Dual-purpose balloon compounds, Fast-rise balloon compounds; Correlation of film properties with flight data. Effect on flight conditions on balloon film performance: Effect of pre-elongation; Effect of ozone; Effect of infra-red radiation; Effect of ultra-violet and other short-wave radiation; Correlation of physical properties with flight performance; Prediction of balloon performance. Study of balloon configuration.

AD-402 711 Div. 1, 26
(TISTA/LSK) OTS price $5.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
FLUID CONTAMINATION SURVEY OF 143 NAVAL AIRCRAFT HYDRAULIC SYSTEMS.
Final rept.,
by N. F. Robinson. 13 Mar 63, 50p. 31228
Contract NOw62 0297, Task 62 2
Unclassified report

Descriptors: *Hydraulic systems, *Hydraulic fluids, *Naval aircraft, Contamination.

A survey of hydraulic fluid contamination was made in which 79 airplanes, plus several test stands, were sampled. The results are presented in tabular and graphical form. An analysis of the data of the survey leads to the conclusion that substantially cleaner systems can be maintained with no great increase in cost. Recommendations are made concerning the maximum permissible level of contamination, and procurement of components which will operate reliably at the fluid contamination levels to which they will be subjected. (Author)

AD-402 751 Div. 1, 25, 9, 30
(TISTB/AW) OTS price $.75

Pioneer Central Div., Bendix Corp., Davenport, Iowa.
CAPILLARY ACTION LIQUID OXYGEN CONVERTER FOR WEIGHTLESS ENVIRONMENT.
Final rept., 1 May 61-25 Aug 62,
by Duane E. Hinds, and John Cleveland. Jan 63, 17p.
Contract AF33 616 8185, Proj. 6373, Task 637302
AMRL TDR63 10
Unclassified report

Descriptors: *Weightlessness, *Life support, Space capsules, Capillary tubes, Oxygen, Liquefied gases, Oxygen equipment.

A 25-liter, capillary-action liquid-oxygen converter was fabricated to incorporate all the components required to provide a completely operational, self-contained system to supply breathing oxygen in a weightless environment. The converter design of functional components and the principle of operation combined the forces of surface tension, wetting, and capillary action of liquid oxygen to provide adequate forces to insure satisfactory operation of the system during space environments. These forces will provide for the expulsion of liquid oxygen under standard conditions, during acceleration forces up to and including 14G, and in the weightless condition. The report includes all the test data and results of the complete development program and the physical arrangement required for the capillary action converter system. The testing which could be accomplished in the laboratory gave every evidence that the design concept is satisfactory for weightless operation. (Author)

AD-402 774 Div. 1, 23
(TISTA/GEC) OTS price $8.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
A SIMULATOR STUDY OF TILT-WING HANDLING QUALITIES,
by Harry T. Breul. Mar 63, 84p. RE162
Contract NOw60 0396
Unclassified report

Descriptors: *Vertical take-off planes, Hovering, Flight simulators, Control systems, Damping, Maneuverability, Handling, Stability, Equations, Motion, Tilt wing.

An experimental investigation was performed to study handling qualities of tilt-wing type VTOL aircraft. A flight simulator consisting of a cockpit free to pitch and roll, and an optical display system providing a visual illusion of motion in the remaining 4 degrees of freedom was employed in this program. Control sensitivity and rate damping requirements about each axis at hover were investigated relative to the performance of maneuvering tasks that require, in general, more positive control applications than trimming and more finely coordinated multiple control utilization than single degree of freedom move and stop maneuvers. That handling qualities requirements depend upon the maneuver in which they are measured and the degree of simulator sophistication is clearly suggested by comparing the results of the present study with published NASA data representing the extremes in the ''maneuver spectrum.'' Control response-time characteristics, as well as control, aerodynamic rate, and gyroscopic coupling effects were also investigated at hover. The results of the control response-time variations are most interesting, for they suggest that the criterion upon which present helicopter specifications are based (i.e., time to reach proper direction of acceleration) is inadequate. (Author)

AD-402 777 Div. 1, 9
(TISTA/GEC) OTS price $2.25

Technology, Inc., Dayton, Ohio.
WIND TUNNEL STUDY OF PARACHUTE CLUSTERING.
Final rept.,
by J. F. Braun and W. B. Walcott. Apr 63, 80p.
Contract AF33 657 7985, Proj. 6065, Task 606502
ASD TDR63 159 Unclassified report

Descriptors: *Parachutes, *Ribbon parachutes, Wind tunnel models, Aerodynamic characteristics, Pitch (Motion), Captive tests, Stability, Drag, Model tests.

Four types of parachute canopies were tested in a 12-foot vertical wind tunnel at a velocity of approximately 100 fps to determine the static stability and drag characteristics of multiple canopies in various clustered arrangements under captive and equilibrium test conditions. Solid Flat Circular, Extended Skirt, Ringslot, and Circular Flat Ribbon were the types of canopy tested. Canopies of each type were tested individually and in clusters ranging from two to seven canopies per cluster. A special two-component balance was fabricated to measure the pitching moment and tangential force over an angle-of-

attack range of ±25 degrees. The effects of riser length, angle-of-attack, reefing ratio, and the number of canopies in a cluster on the tangential force and static stability are discussed. Also, the characteristics peculiar to the solid type of canopies (Solid Flat Circular and Extended Skirt) and to the ribbon type of canopies (Ringslot and Circular Flat Ribbon) are noted. (Author)

AD-402 813 Div. 1
(TISTA/GEC) OTS price $2.60

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
DESIGN REPORT OF AN ENGINE PERFORMANCE INDICATOR,
by Thomas D. DePasqua. 26 Mar 63, 21p. AI6320
Unclassified report

Descriptors: *Instrument panels, *Turbojet engines, Jet fighters, Exhaust gases, Temperature, Fuel meters, Lighting equipment, Flow meters, Design, Jet training planes, Display systems, Monitors.

The development of a simplified version of an Engine Performance Indicator is reported. The instrument is a three-module, servo-driven indicator which displays information relative to Engine Speed (%RPM), Exhaust Gas Temperature (EGT), and Fuel Flow (F.F.) utilizing vertical tape type of readout. The compatibility of this indicator with the integrated display system was evaluated. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-402 586 Div. 2, 8
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GIGANTIC RADIO EYE,
by T. Akkuratova. 28 Mar 63, 4p.
FTD TT63 110.
Unclassified report

Trans. from Trud, p. 4, 8 Dec 1962.

Descriptors: *Telescopes, Extraterrestrial radio waves, Antennas, Radio equipment.

At a distance of several kilometers from Serpukhov the largest diagonal radio telescope in the world is being built. This gigantic eye will make it possible for scientists to take a look into the unexplored depths of the universe. Right now the construction of the enormous east-west antenna having a length of one kilometer is being built. (Author)

AD-402 589 Div. 2
(TISTP/JW) OTS price $15.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADAR METHODS OF METEOROLOGICAL OBSERVATIONS (Radiopokatsionnye Metody Meteoropogicheskikh Nabpyudeniy),
by V. S. Nelepets and V. D. Stepanenko.
11 Apr 63, 220p.
FTD TT62 1423
Unclassified report

Trans. from Gidrometeorologicheskoye Izdatel'stvo Leningrad, pp. 1-175, 1961.

Descriptors: *Meteorology, *Meteorological radar, Measurement, Radar.

The use of radar methods in meteorology, some general problems in radar, the theory of radar sounding of atmospheric formations, and many practical problems in this field are covered. (Author)

AD-402 594 Div. 2
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VOLCANOES ON VENUS,
by N. A. Kozyrev. 29 Mar 63, 3p.
FTD TT63 05
Unclassified report

Trans. from Zarya Vostoka, 18 Dec 62, pp. 4.

Descriptors: *Venus, Volcanoes, Absorption spectrum.

An expedition into a region of active volcanoes of the Klyuchevskiy group at Kamchatka was successful in obtaining photographs of the absorption spectra of the smoke and flame at certain volcanoes. They revealed the presence of two absorption bands in the visible region of the spectrum. Later, bands of this same type were observed in the spectrum of Venus. However, their nature has remained entirely unexplained up to the present. The existence of such bands in the spectra of volcanic fumes now provides a basis for assuming that there is strongly developed volcanic activity on Venus. These bands are entirely absent in the Martian atmosphere. Thus, there is a basis for assuming that volcanic activity on this planet, if it does exist, is significantly weaker than on Venus and Earth. (Author)

AD-402 602 Div. 2
(TISTP/MFA) OTS price $7.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Final technical rept., 19 Dec 61-18 Dec 62,
by R. S. Brown and E. J. Martin, Jr. 18 Dec 62, 74p. MRI
Contract DA44 009eng3769
Unclassified report

Descriptors: *Geodesics, *Electromagnetic waves, Radiofrequency, Radio waves, Atmosphere, Troposphere, Refractive index, Measurement, Reflection, Mapping, Position finding, Wave transmission.

A feasibility study was undertaken to determine whether it was possible to deduce the index-of-refraction profile along some path in the atmosphere from physical measurements made external to that path. This problem was solved and it was demonstrated that it was possible to make this remote measurement of the index-of-refraction profile using a quantity called the 'transient reflection coefficient' of the atmosphere. When an electromagnetic wave propagates into a medium of changing index-of-refraction, a certain portion of the incident energy is reflected back toward the source. The ratio of the reflected energy to the transmitted energy is called the reflection coefficient ot the atmosphere. It was first shown that this reflection coefficient,

which is a function of the frequency of the incident wave, is uniquely determined by the index-of-refraction profile. In addition, it was demonstrated that if the value of the reflection coefficient were known for all frequencies, then it would be possible to reconstruct the index-of-refraction profile. Because the index-of-refraction profile changes with time, the reflection coefficient is also a time variable. Consequently, in order to determine the value of the reflection coefficient at all frequencies, it would be necessary to make a large number of simultaneous measurements each at a different frequency. Such a system, although feasible, would not be practical. It was because of this objection that the concept of a ''transient reflection coefficient'' was introduced. (Author)

AD-402 696 Div. 2
(TISTP/FEM) OTS price $9.60

Lamont Geological Observatory, Palisades, N. Y.
MAGNETIC ANOMALIES CAUSED BY TWO-DIMENSIONAL STRUCTURE: THEIR COMPUTATION BY DIGITAL COMPUTERS AND THEIR INTERPRETATION,
by J. R. Heirtzler, G. Peter, M. Talwani, and E. G. Zurflueh. Oct 62, 1v. TR6; 6 62
Contract Nonr266 48
Unclassified report

Descriptors: *Terrestrial magnetism, Magnetic moment, Earth, Magnetic fields, Earth models, Measurements, Digital computers, Equations, Programming (Computers), Anomalies.

AD-402 704 Div. 2
(TISTP/MFA) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
GEOLOGICAL AND GEOPHYSICAL CONSIDERATIONS IN RADIO PROPAGATION THROUGH THE EARTH'S CRUST,
by L. A. Ames, J. W. Frazier, and A. S. Orange. Feb 63, 6p.
AFCRL 63 40
Unclassified report

Descriptors: *Lithosphere, *Geology, *Rock (Geology), Structural geology, Igneous rock, Metamorphic rock, Folds (Geology), Resistance (Electrical), Measurement, Radio waves, Porosity, Anisotropy, Electrical properties, Geophysics.

Geological and geophysical considerations applicable to radio propagation through the rock strata of the basement complex are presented. Information on electrical characteristics of rocks, based on laboratory measurements on samples, is shown to be misleading because in situ conditions are very difficult to analyze and reproduce. The complexity of the basement geology adds to the difficulty of predicting in situ rock characteristics pertinent to radio propagation. Folding and fracturing of the strata, variegated rock types, and the anisotropy of rock resistivity cause the actual propagation path loss to be vastly different from that predicted on the basis of a simple geological model. This conclusion is supported by the available experimental data. Deep resistivity measurements made from the surface indicate that basement strata will have resistivities of the order of 1000 to 10,000 ohm-meters over most of the United States. (Author)

AD-402 706 Div. 2, 30
(TISTP/MC) OTS price $2.00

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF A SMALL SOIL STRAIN GAGE.
Final rept. May-Nov 62,
by W. B. Truesdale. Mar 63, 68p.
Contract AF29 601 5343, Proj. 1080, Task 108006
AFSWC TDR63 3
Unclassified report

Descriptors: *Strain gages, *Soil mechanics, Instrumentation, Meters, Circuits, Design.

A small strain gage was developed for the measurement of static and dynamic strains when embedded in soil samples. The gage itself consists of two sets of two coil discs; associated instrumentation includes electronic driving, amplifying, and recording circuitry. One set of coils is embedded in soil as the strain sensing element; the other is externally positioned to serve as a reference. The principle of operation is that of an air core differential transformer with a null balancing system to permit accurate measurements of small strains. The gage is a reliable precision measuring device. Results of static and dynamic evaluations prove that the coils can be consistently placed in soil specimens within the spacing and alignment requirements. Thus, the gage accurately defines the relative position of two points in the soil and accurately measures the change in spacing of these points when the specimen is strained. (Author)

AD-402 753 Div. 2, 25, 30
(TISTP/GRW) OTS price $7.60

Purdue U., School of Civil Engineering, Lafayette, Ind.
LABORATORY EXPERIMENTS ON THE RESPONSE OF SOILS TO SHOCK LOADINGS.
Interim rept., 1 Sep 60-30 June 62,
by G. A. Leonards. Jan 63, 72p.
Contract AF29 601 2830, Proj. 1080, Task 108001
AFSWC TDR62 90 Unclassified report

Descriptors: *Soils, *Shock waves, *Strain gages, Clay, Load distribution, Wave transmission, Velocity, Model tests, Propagation, Stresses, Intensity, Calibration.

Research was carried out to develop, on the basis of direct measurements, mathematical models suitable for describing the propagation of a compression shock wave through soils--principally through partly saturated clays. This interim report deals with the selection of a suitable type of laboratory test and with the design, calibration, and use of gages to measure stress and strain in the vicinity of a point during the propagation of a shock wave. Preliminary results from tests on samples of compacted clay are also included. (Author)

AD-402 816 Div. 2
(TISTA/GEC) OTS price $6.60

Manchester U. (Gt. Brit.).
LUNAR INFRA-RED MEASUREMENTS,
by R. Sternberg. Oct 62, 69p. TN2
Contract AF61 052 400
AFCRL 63 459 Unclassified report

Descriptors: *Moon, Measurement, Radiometers, Infrared filters, Surface properties, Optical properties, Infrared spectroscopy, Infrared radiation, Spectra (Infrared).

Following the successful development of techniques for producing multilayer interference filters for the infra-red out to 20 microns, a radiometer was designed and constructed to make observations of the moon in the atmospheric window 8 - 13 microns, using the 50-inch telescope at Asiago. The primary aim was to use this instrument to determine the emissivity of the lunar surface by measuring the radiant flux from the moon in two or more narrow spectral regions within this band. Due to unusually unfavourable weather conditions during the first observing expedition (the only one so far) this objective could not be achieved. A number of anomalous temperature distributions were however found, which appear to be associated with ray craters. (Author)

AD-402 831 Div. 2
(TISTP/FR) OTS price $3.60

Marine Lab., U. of Miami, Coral Gables, Fla.
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS IN THE TROPICS.
Interim technical rept. no. 2, 1 Sep-31 Dec 62,
by Harold P. Gerrish and Homer W. Hiser. Apr 63, 32p. 82262; ML63255
Contract DA36 039sc89111, Proj. 3A99 27 005
Unclassified report

Descriptors: *Radar echo areas, Rainfall, Motion, Wind, High altitude, Cloud cover, Meteorological satellites.

The synoptic situation and an analysis of the cloud cover as seen by Tiros III satellite is presented for a case study of 1800Z, 26 August 1961. Particular reference is made to the translational motion of precipitation echoes in the tropics, as determined by tracking selected small echoes and cells. Comparisons of these motions are made with winds aloft. The space-smoothed translational motion of precipitation echoes in this case study most nearly represented the wind flow at 10,000 ft. (Author)

AD-402 839 Div. 2
(TISTP/FR) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
POINT BARROW TRIALS - FY 1962; ABLATION AND CRYSTAL STUDIES OF SEA ICE.
Final rept.
by N. S. Stehle. 2 Apr 63, 28p. TRR238
Proj. Y F015 11 012
Unclassified report

Descriptors: *Ice, Crystal structure, Melting, Salinity, Thickness, Construction, Oceans.

Trials were conducted at Point Barrow, Alaska on the deterioration, ablation and some physical characteristics of natural and constructed sea ice. Although deterioration occurred throughout the ice sheet, ablation occurred only at the surface. Observations on temperature, salinity, density and crystal orientation of these two ice types showed that the average ice temperature for the total ice thickness was about the same for an undisturbed natural ice area as for a constructed ice area. It was found that the high salinity of constructed ice did not greatly affect the salinity of the underlying natural ice and that with time the salinity and density of the constructed ice approached that of natural ice. Also it was observed that the preferred C-axis orientation of sea ice is towards the horizontal, although snow and wind influence a random orientation and crystal size. It was concluded that prevention and reduction of ablation during thaw should improve the characteristics of sea ice, but further knowledge is needed to determine the influence and effect of the size and C-axis orientation of the ice crystals. Improved field sampling and testing techniques are needed to obtain more accurate knowledge of the properties of ice. (Author)

AD-402 963 Div. 2, 32
(TISTP/MFA) OTS price $5.60

Agricultural Research Service, Cornell U., Ithaca, N. Y.
SOIL MOISTURE ANALYSES, ELLIS HOLLOW, ITHACA, N. Y., 1960 AND 1961,
by J. H. Shinn, K. W. Brown, and R. F. West. Sep 62, 1v. IR62 6; RR3 57
Task 3A99 27 005 08
Unclassified report

In cooperation with N. Y. S. College of Agriculture, Cornell U., Ithaca, N. Y.

Descriptors: *Soils, *Moisture, Energy, Heat transfer, Silt, Soil mechanics, Tensiometers, Agriculture, Plants (Botany), Corn, Analysis, Measurement.

A summarization of soil moisture data taken for an energy balance study during the 1960 and 1961 growing seasons in Ellis Hollow at Ithaca, New York is presented. The soil is Chenango channery silt loam, fan phase. This is a moderately well-drained soil, and has a layer of glacially deposited stones at a depth of two feet. Little soil development is present below two feet, but some root penetration does occur. Eighty-five percent (by weight) of the roots of mature corn are distributed in the first 18 inches. (Author)

AD-403 002 Div. 2
(TISTP/FEM) OTS price $3.60

Defence Research Board (Canada)
A TECHNIQUE FOR MEASUREMENT OF SWELLING PRESSURES OF MONTMORILLONITE UNDER DEPRESSED TEMPERATURES (SOME SHEARING CHARACTERISTICS OF FROZEN SOIL). PART 2,
by Raymond Yong and L. O. Taylor. Sep 61, 32p.
DRB Rept. D. PHYS. R G Misc 7
Unclassified report

Descriptors: *Soils, *Soil mechanics, Clay, Water, Clay minerals, Electrochemistry, Pressure, Temperature, Static electricity, Electric potential, Measurements, Numerical analysis, Difference equations, Differential equations, Integral equations, Permafrost, Low temperature research.

A general study of frozen soil characteristics with specific reference to interparticle action under depressed temperatures is presented. The behaviour of clay-water systems subjected to depressed temperatures and involving electrochemical forces of interaction is evaluated. This report concerns itself with the development of the Gouy-Chapman theory as applied to soils, taking into consideration the effect of temperature and its influence on the dielectric constant; and the instrumentation and procedure for measurement of the resultant swelling pressure which have been designed specifically for this study is reported. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-403 012 Div. 2
(TISTP/JW) OTS price $1.10

Arizona U., Tucson.
CHANGES IN THE CLIMATE AND VEGETATION OF THE SONORAN DESERT.
Final rept.,
by James Rodney Hastings. 1 May 62, 3p.
Grant NONRG0065 92
Unclassified report

Descriptors: *Climatology, Deserts, Plants (Botany).

AD-403 013 Div. 2, 1
(TISTA/GEC) OTS price $1 60

Aerospace Information Div., Washington, D. C.
HIGH-ALTITUDE ATMOSPHERIC SOUNDING WITH THE IL-28 AIRCRAFT.
1 May 63, 13p. T63 54
Unclassified report

Trans. from Vyosotnoye zondirovaniye atmosfery na samolete I1-28. IN: Tsentral'naya aerologicheskaya observatoriya. Trudy, no. 43, pp. 47-56, 1962.

Descriptors: *Jet bombers, High altitude, Meteorological instruments, Meteorology, Data storage systems, Atmospheric sounding.

This article describes a new type of aircraft sounding of the atmosphere, including the equipment for a high-level sounding aircraft, the Il-28, its flight regime, observations in flight, and the peculiarities of processing the tape record of the K4-51 optical automatic recorder. A program of vertical and horizontal sounding of the atmosphere using specially equipped Il-28 aircraft was organized in 1960 at 11 major airports in the USSR for the operational servicing of scheduled high-speed aircraft, as well as for scientific research work. This high-level sounding determines various characteristics of the state of the atmosphere both vertically (up to altitudes of 12 km) and horizontally, with flights of up to 400 to 500 km from the airport. The aircraft crew consists of three members: pilot, navigator, and aerologist, the latter in the tail cabin. The results of the observations made during the flight are transmitted by radio from the aircraft by the aerologist. These radiograms are used in operations by the weatherman on duty and by the traffic control specialist. (Author)

AD-403 054 Div. 2
(TISTP/GRW) OTS price $11.00

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION.
Final rept., Vol. 2,
by G. F. McDonough, Jr. 15 Mar 63, 193p.
Contract DA49 146xz073
DASA 1357, Vol. 2
Unclassified report

Descriptors: *Nuclear explosions, *Underground explosions, Equation of state, Partial differential equations, Shock waves, Propagation, Stresses, Soils, Blast.

AD-403 084 Div. 2, 30
(TISTP/MC) OTS price $6.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
ANALOG COMPUTATION OF TIME-VARYING POWER SPECTRA OF SEISMIC WAVES,
by Vernon L. Larrowe and Raymond E. Crabtree.
Apr 63, 62p. 3708 15T; 5178 8T
Contracts AF49 638 911; and AF49 638 1170
Unclassified report

Descriptors: *Seismographs, *Seismic waves, *Analog computers, Resolution, Frequency, Time, Analog computers,.

An analog computing technique for measuring time-varying power spectra of seismic signals was developed. The signal to be analyzed is recorded on a magnetic-tape loop so that it may be played back repeatedly, and the analog computing equipment, connected to the output of the tape-playback apparatus, measures as a function of time the power level at a different specific frequency for each passage of the tape. The concept of a time-varying spectrum is developed and the theory of the analysis method used is derived. It is shown that in measuring time-varying power spectra, there is a theoretical relationship between the time resolution and frequency resolution such that any adjustment which gives an improvement in one results in a degradation of the other. This conflict is not caused by equipment limitations, but instead is a result of theoretical relations between the time and frequency domains. A plot of the energy- or power-density spectrum of a seismic wave is not smooth, but instead shows a number of sharply defined peaks. It was found experimentally that a filter bandwidth of 2 1/2% for the analyzing apparatus gave satisfactory frequency resolution without seriously degrading time resolution when magnetic-tape seismograms were analyzed. (Author)

AD-403 090 Div. 2
(TISTP/MC) OTS price $6.60

Engineering-Physics Co., Rockville, Md.
CHARACTERISTIC EMISSIONS FROM AN UNDERGROUND EXPLOSION.
Semi-annual rept. no. 2,
by Dean Reily and Vincent Cushing. 3 Dec 62, 65p.
Contract DA49 146xz089
Unclassified report

Descriptors: *Underground explosions, *Nuclear explosions, Seismic waves, Mechanical waves.

The work described was performed for the Defense Atomic Support Agency under the sponsorship of Advanced Research Projects Agency as a part of the VELA-UNIFORM effort and deals with research in determining the seismic wave shapes emitted from an underground nuclear explosion. The propagation of waves very close-in to the source of the explosion where the soil is subject to very high compressive forces is discussed. Results of the analysis are given in a form similar to typical experimental data--particle velocity and displacement. The transition of the disturbance to seismic waves is treated. Results are expressed in terms of particle acceleration, velocity and displacement versus time. The elastic precursor which propagates ahead of the main disturbance, in the event that this main disturbance at some time propagates subsonically, is considered. Some qualitative results of the

analysis are presented showing the wave forms expected at a hypothetical gage station. The manner in which information obtained from the precursor can aid in the determination of equation of state and other details of the wave propagation phenomena is also discussed. Secondary wave generation as the result of spall impact is described. A rudimentary analysis is undertaken which indicates the generation of a type of mechanical disturbance quite unlike the usual body wave disturbances issued directly from the explosive source.

AD-403 114 Div. 2
(TISTP/JEA) OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
WIND, WIND SHEAR AND TURBULENCE REPRESENTATION FOR ATMOSPHERIC BALLISTICS,
by Oskar Essenwanger. 1 Apr 63, 32p. RR TR63 7
Proj. 1B2 79191D678
Unclassified report

Descriptors: *Wind, *Atmospheric motion, Wind direction indicators, Velocity, Turbulence, Measurement, Distribution, Meteorological parameters, Radiosondes, High altitude, Surface area, Shear stresses, Analysis.

Four topics in wind analysis are briefly discussed. Research endeavors to treat the vertical variation of the wind profile as an entity considering simultaneous occurrences of the wind vector are described. This new approach, the so-called characteristics method, exhibits advantages over other methods. Profiles with maximum speed values in the frequency distribution of height levels are analyzed and two major types are discussed. Preliminary results of the investigation of the wind shear parameters as a function of the scale of distance delineate the deficiency of deriving shear parameters from smooth radiosonde records. The final topic deals with the analysis of the turbulence parameters, and the separation of the wind profile from missile flight recordings into stationary and nonstationary parts. (Author)

AD-403 128 Div. 2
(TISTP/MFA) OTS price $2.60

Texas A. and M. Coll., College Station.
RESEARCH CONDUCTED IN GEOLOGICAL OCEANOGRAPHY.
Progress rept. 1 May 62-30 Apr 63.
30 Apr 63, 20p. Ref. 63 10A
Contract Nonr211904, Proj. NR083 036
Unclassified report

Descriptors: *Oceanology, *Sedimentation, Sedimentary rock, Paleontology, Carbonate minerals, Sand, Silt, Clay, Reefs, Coral reefs, Beaches, Limestone, Petrology, Geologic age determination, Gravel, Geology, Stratigraphy.

AD-403 140 Div. 2, 32
(TISTP/MFA) OTS price $8.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
RESEARCH CONCERNING FORECASTING ANOMALOUS PROPAGATION AT HIGH LATITUDES.
Final rept.,
by S. C. Coroniti, J. R. Herman, G. E. Hill, R. B. Penndorf and G. F. Rourke. 28 Feb 63, 100p. TR63 15
Contract AF19 604 4092, Proj. 4603, Task 460304
AFCRL 63 54
Unclassified report

Descriptors: *Radio communication systems, *Radio waves, *Abstracts, Bibliographies, Absorption, Meteorological charts, Ionosphere, Propagation, High frequency, Geophysics, Terrestrial magnetism, Magnetic storms, Weather forecasting, Reports.

Research concerning variations in the Arctic ionosphere and polar radio-propagation conditions has been carried out for the past several years. The objective has been to obtain information useful for forecasting anomalous propagation conditions and improving radio communications in the high-frequency band at high latitudes. Results of the research are given in the form of abstracts to all scientific reports and papers issued during the course of the work. Eighteen scientific reports and twenty-one related journal articles have been published; and in addition, seventeen symposium papers have been presented. Appendix V-A contains an extensive bibliography concerning PCA, auroral zone absorption, and related geophysical phenomena. A brief discussion of the detection techniques, characteristics, and causes of anomalous high-latitude absorption is given. A list of polar cap absorption (PCA) events occurring during the first six months of IGY is given along with the appropriate synoptic fmin charts in appendix V-B. (Author)

AD-403 141 Div. 2
(TISTP/GRW) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
NARRATIVE OF BEAR CRUISE #280, JULY 1962,
by Elizabeth T. Bunce. Mar 63,
Contracts Nonr219600 and 402900
Unclassified report

Continuation of Contract Nonr136700.

Descriptors: *Ocean bottom, *Echo ranging, *Seismic waves, Oceanographic vessels, Bathythermograph data, Reflection, Refraction.

This report includes:
CRUISE PLAN FOR BEAR #280, 9 JULY-31 JULY 1962, by Elizabeth T. Bunce. July 62. Contract Nonr136700, Proj. NR261 102.

This is a journal of BEAR Cruise 280. It contains the track chart and a summary of the data taken on the cruise. Most of the time was spent about 150 miles southeast of Cape Hatteras during a cooperative seismic refraction program which included R. V. CRAWFORD, as well as shore stations occupied by the University of Wisconsin. The scientific program of the BEAR included an echo-sounding survey, scattering layer observations, and seismic refraction studies. (Author)

AD-403 143 Div. 2
(TISTP/GRW) OTS price $6.60

Naval Air Station, Norfolk, Va.
CYCLONES AND ANTICYCLONES SOUTH OF 50 DEGREES SOUTH.
Sep 62, 64p. NWRF16 0962 067
Unclassified report

Descriptors: *Cyclones, *Anticyclones, *Meteorological charts, Barometric pressure, Periodic variations, Weather forecasting.

Results of a study of the percentage frequency of occurrence of surface pressure systems on a monthly and seasonal basis are presented. Although based upon the best available Southern

Hemisphere surface synoptic charts, the results should be regarded as tentative due as much to the uncertainties of analysis over the tremendous expanse of the southern oceans and the continent of Antarctica as to the short period (6 years) for which surface charts were available. This study provides information in improving both the analysis and forecasting of meteorological events of importance to naval units operating south of 50 S. (Author)

AD-403 288 Div. 2
(TISTP/FR) OTS price $22.25

Chesapeake Bay Inst., Johns Hopkins U., Annapolis, Md.
ATLAS OF SALINITY AND TEMPERATURE DISTRIBUTIONS IN CHESAPEAKE BAY 1952-1961 AND SEASONAL AVERAGES 1949-1961.
Graphical summary rept. no. 2,
by E. D. Stroup and R. J. Lynn. Feb 63, 410p.
Ref. 63 1
Contract Nonr24820, Proj. NR083 016
Unclassified report

Supersedes ref. no. 52-4, AD-6732.

Descriptors: *Sea water, Temperature, Salinity, Periodic variations.

This atlas has two major parts. Part I is a graphical summary of salinity and temperature observations from sixteen Bay cruises conducted during the period 15 July 1952 to 1 August 1961. There are sixteen sets of charts, one set for each cruise. Part II is a graphical presentation of the seasonal salinity and temperature distributions for the Chesapeake Bay as averaged from twenty-four Bay cruises conducted during the period 1 July 1949 to 1 August 1961. There are four sets of charts, one set for each season. (Author)

AD-403 332 Div. 2, 1
(TISTA/GEC) OTS price $17.50

Denver Research Inst., Colo.
BALLOON FLIGHT OF JULY 14, 1962,
by David G. Murcray, James N. Brooks, Jay O. Green and Marie M. Working. 5 Apr 63, 261p.
FDR7
Contract AF33 616 7633
Unclassified report

Descriptors: *Balloons, Experimental data, Infrared radiation, Ultraviolet radiation, Radiometer, Solar radiation, Infrared detectors, Infrared scanning, Indium compounds, Antimony compounds, Intermetallic compounds, Background, Flight paths, Scientific research.

This report presents the results obtained on a balloon flight made with an automatic programmed radiometer system. The equipment was launched from Ft. Wainwright, Alaska, July 14, 1962. The radiometer was equipped with a liquid oxygen cooled InSb cell as a detector and measurements were made of the infrared background radiation in various wavelengths intervals between 1.8 to 5.0 microns. (Author)

AD-403 335 Div. 2, 25, 20
(TISTP/JW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
DISSIPATION EFFECTS CONTROLLING THE ELECTRICAL MORPHOLOGY OF THE MESOSPHERE,
by P. A. Goldberg. Apr 63, 18p. RM3585PR
Contract AF49 638 700
Unclassified report

Descriptors: *Atmosphere, *Particles, *Atmospheric electricity, Electrical properties, Electromagnetic properties, Excitation, Ionization, Low frequency, Gases, Refractive index.

Electrical dissipation in the mesosphere is dominated by gas particle collisions. Hence, the electrical properties of this region are controlled by the density of the atmosphere. For low-frequency propagation, the electromagnetic properties of the mesosphere can be described in terms of variations with altitude of the local complex refractive index. For the simple condition of excitation of the mesosphere by a single kind of ionizing radiation, the complex refractive index should have exponential-scale variation with altitude of less than 12 km for the lower mesosphere. Sudden onset of more complex conditions of excitation may trigger the mesosphere into a state of shelving or ducted structure in its electrical properties. Depending on the details of the excitation, such ducting will contain regions of negative gradients in the altitude variation of the electrical properties, instead of merely the positive gradient with a 12-km upper limit. (Author)

AD-403 398 Div. 2
(TISTP/WH) OTS price $4.60

Cologne U. (Germany).
RESEARCH ON THE SYNOPTICAL MEASUREMENTS OF THE VERTICAL OZONE DISTRIBUTION.
Final technical rept.,
by H. K. Paetzold. 1 Jan 63, 26p.
Contract AF61 052 330
AFCRL 63 467
Unclassified report

Descriptors: *Ozone, *Air mass analysis, Jet air stream, Data processing systems, Weather forecasting, Absorption spectrum, Optical equipment, Distribution, Atmospheric sounding.

Procedure for the evaluation of the soundings obtained with the optical ozone sonde is described. The meridional variations of the vertical ozone profile is derived from the soundings of the program. The correlation of the ozone variation with the weather situation is studied. Simultaneous ozone soundings and stratospheric warmings are presented. (Author)

AD-403 461 Div. 2
(TISTP/GRW) OTS price $4.60

New York U. Coll. of Engineering, N. Y.
A DIABATIC WEATHER PREDICTION MODEL WITH A CONSISTENT ENERGY INTEGRAL,
by Joseph P. Gerrity, Jr. Mar 63, 43p. SR4; GSL63 6
Contract Nonr28509
Unclassified report

Descriptors: *Atmosphere models, *Air mass analysis, *Thermodynamics, Meteorogical phenomena, Partial differential equations, Integrals, Enthalpy, Weather forecasting.

A vertically integrated, diabatic model is modified so that it possesses an invariant mass integral of the sum of enthalpy and the kinetic energy of the non-divergent wind in the adiabatic case. The model's linear characteristics are discussed, and a series of numerical experiments utilizing idealized initial conditions is proposed. (Author)

AD-403 471 Div. 2
(TISTP/JW) OTS price $7.60

Florida State U., Tallahassee.
THE KINETIC-ENERGY BUDGET OF THE STRATOSPHERE OVER NORTH AMERICA DURING THE WARMING OF 1957,
by M. A. Lateef. 15 Apr 63, 96p. SR1
Contract AF19 628 394, Proj. 8604, Task 860405
AFCRL 63 429

Unclassified report

Descriptors: *Energy, *Stratosphere, Boundary layer transitions, Kinetic theory, Climatology.

The large and rapid decrease in kinetic energy of the lower stratosphere (100-25 mb) during the warming of mid-January to mid-February, 1957, was investigated in terms of energy transport and generation processes. These processes are represented by the corresponding terms in the mechanical energy equation. The evaluation of these terms was carried out using the 100-mb, 50-mb and 25-mb values of geopotential, temperature, the geostrophic wind components and adiabatic vertical motion at each point of a grid covering most of the North American continent and the adjacent North Atlantic. The investigation considered a limited volume which exchanged energy with the surrounding atmosphere through the vertical boundaries as well as through the upper and lower boundary pressure surfaces. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-402 710 Div. 3
(TISTM/LMH) OTS price $1.60

Army Biological Labs., Frederick, Md.
DECONTAMINATION OF CLASS III HOOD OR ANIMAL HOLDING SYSTEM WITH FORMALDEHYDE,
by James T. Sinski and Wallace L. Pannier.
Apr 63, 11p. TM1
Proj. 4B92 02 034, Task 04

Unclassified report

Report on Biological Warfare Agent Process Research.

Descriptors: *Decontamination, Microorganisms, Toxins and antitoxins, Cleaning, Protective coverings, Biological warfare agents.

The Class III system is composed of Freon-tight, stainless steel cabinets flanged and bolted or welded together to form a system in which research on any microorganism or its products can be pursued with personal safety. Decontamination of a Class III system is a process by which all microorganisms and toxins in the system are killed or denatured. As an indicator of decontamination, a prescribed amount of Bacillus subtilis var. niger (B. globigii) spores on filter paper discs is used. The preparation, placement, and handling of these discs for control and assessment of decontamination is outlined. The apparatus for and the effective use of formaldehyde generation are described. The proper control, use, and decontamination procedures for the air filters, autoclaves, electric outlets, and vacuum lines are indicated. Various methods of washing the system after the decontamination is complete and verified with the biological indicator are listed. (Author)

AD-403 499 Div. 3, 26
(TISTM/EJH) OTS price $5.60

Atlantic Research Corp., Alexandria, Va.
SURVEY OF RECENT INVESTIGATIONS OF PLASTIC-BONDED AND CASTABLE SMOKE COMPOSITIONS.
Special rept.,
by L. A. Salvador, R. S. Scheffee, and J. S. Bowen. 4 Apr 63, 55p.
Contract DA18 108AMC40A

Unclassified report

Descriptors: *Smoke munitions, *Binders, *Plastics, Casting, Pyrotechnics, Grenades, Colored smokes, Smokes, Polymers, Stability, Safety, Materials, Manufacturing methods, Polyester plastics, Vinyl plastics, Tests, Bibliographies, Experimental data.

A survey of recent work in the development of castable and plastic-bonded pyrotechnics was made. The survey included the search of available literature and private communications with personnel concerned with these developments. Although a great deal of work has been done on castable pyrotechnics for flares and fuel blocks, apparently the only work specifically oriented toward smoke or agent dissemination munitions was conducted by Olin-Mathieson Chemical Corporation under Contracts DA 18-108-cml-5512 and 5920, by the Weapons Research Division at CRDL, by the Engineering Group at Edgewood Arsenal, and by Dugway and Aberdeen Proving Grounds. Only two plastic binder systems were developed to the extent that they are practical. One formulation is based on polyvinyl acetate with a solvent extender and one is based on Laminac 4116 polyester resin with styrene added to increase fluidity. Results of tests, as well as other work to date, indicate that plastic-bonded grenades show promise and should be developed more fully. (Author)

4. CHEMISTRY

AD-402 584 Div. 4, 14
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS IN THE SYNTHESIS OF ORGANO-ELEMENTARY HIGH MOLECULAR COMPOUNDS,
by V. V. Korshak. 4 Apr 63, 24p.
FTD TT63 121

Unclassified report

Trans. from Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva, 7:2, pp. 122-131, 1962.

Descriptors: *Polymers, *Heat resistant plastics, *Metalorganic compounds, Silicon compound, Polymerization, Copolymerization, Complex compounds, Chelate compounds, Bibliography, Scientific research.

Elemento-organic compounds represent a field lying between organic and inorganic chemistry which pertains to elemento-organic polymers. Elemento-organic high molecular compounds can be divided into two groups. The first group-homochain polymers consist of carbon atoms and all other elements appear to be substituents to these carbon atoms. The second group of elemento-organic high molecular compounds is composed of heterochain compounds containing one or more different elements. The second group includes the majority of known elemento-organic compounds. This report discusses the more important investigations in this field. (Author)

Division 4 - CHEMISTRY

AD-402 595 Div. 4
(TISTM/AW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OXIDATION OF URANIUM DIOXIDE,
by V. G. Vlasov and A. F. Bessonov. 3 Apr 63, 14p.
FTD TT63 102

Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, no. 5, pp. 113-122, 1962.

Descriptors: *Uranium compounds, Dioxides, Chemical reactions, Temperature, Research kinetics, Oxidation.

The oxidation kinetics of uranium dioxide with atmospheric oxygen in the range of from 165-800 and air pressures of 2.5 - 600 mm Hg were investigated. The values of apparent activation energy of the process were calculated at various stages of oxidation. Investigation were the kinetic characteristics of UO2 oxidation with pure oxygen at a range of from 125 to 330 and oxygen pressure of 100 mm Hg. Phase conversion schemes were introduced during the oxidation of uranium dioxide at various temperature ranges. The effect of additions of alkali metal carbonates and oxides of ThO2, ZrO2, TiO2 on the kinetic characteristics of UO2 oxidation process with air was investigated. (Author)

AD-402 667 Div. 4, 14
(TISTM/PCR) OTS price $4.60

Snell, Foster D., Inc., New York.
RAIN REPELLENT.
Interim rept. no. 3, 21 Sep-20 Dec 62, 28 Dec 62, 38p.
Contract NOw262 0557

Unclassified report

Descriptors: *Moistureproofing, *Silicone plastics, *Antirain agents, Titanium, Copolymerization, Surface-active substances, Silanes, Stability, Storage, Sulfates, Sodium compounds, Manufacturing methods, Films, Chemicals, Catalysts.

Stability in storage was found to be greater for the silicone-titanium copolymer alone or in solution in mineral spirits than with combinations of silicone-titanium copolymer and dimethyldiethoxysilane. A saturated solution of p-toluene sulfonic acid was found effective as a catalyst for the silicone-titanium copolymer alone and in solution in mineral spirits when applied to a dry panel in pre-flight application. Its stability on storage was found to be greater than that of sodium bisulfate in paste form. A re-evaluation was made of several surface active agents incorporated in acidified dimethyldiethoxysilane. Instead of quick release at 40 psi, as previously used, a gradual release at 5 psi pressure at a rate of 1 ml/min for 10 minutes was employed. No significant improvement in repellency was obtained when application was made under rain conditions. (Author)

AD-402 799 Div. 4, 25, 14
(TISTM/EJH) OTS price $26.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REACTIONS IN MIXTURES OF SOLIDS (Reaktsii v smesyakh tverdykh veschestv),
by P. P. Budnikov and A. M. Gnistling.
18 Apr 63, 564p.
FTD TT62 911

Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Literatury Po Stroitel'stvu Arkhitekture I Stroitel'nym Materialam Moskva pp. 1-424, 1961.

Descriptors: *Solids, *Crystals, *Mixtures, Crystal structure, Crystal lattices, Thermodynamics, Thermochemistry, Reaction kinetics, Phase studies, Solutions, High pressure research, Ceramic materials, Refractory materials, Oxides, Silicon compounds, Titanium compounds, Chromium compounds, Zirconium compounds, Iron compounds, Cement, Chemical reactions.

The theory, methods of study, and range of application of reactions in mixtures of solid substances, which form the basis for preparation of many important structural and various other types of materials, are discussed. In addition to describing the structure and physicochemical properties of crystalline bodies and their behavior on heating, the book examines the mechanism, thermodynamics, kinetics, classification principles, and methods of controlling the rate of chemical reactions in solids. The results of numerous investigations of the processes in which spinelides, titanates, zirconates, silicates and other technically important compounds are formed by reactions in crystalline mixtures are presented. The applications of the above reactions in the technology of adhesives, refractory materials, and ceramic products are examined. The book is intended for engineering-technical and scientific workers in the structural-materials indstry and related branches of engineering. (Author)

AD-402 974 Div. 4, 20
(TISTM/SJR) OTS price $.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
THE GAS PHASE RADIOLYSIS OF 2-BUTYNE.
Final rept. Mar-Dec 62,
by L. A. Harrah, R. E. Rondeau, S. Zakanycz, D. Hale, and D. Dunbar. Feb 63, 14p.
Proj. 7367, Task 736701
ASD TDR63 65

Unclassified report

Research on Characterization and Properties of Materials.

Descriptors: *Organic compounds, *Radiation chemistry, Radioactive isotopes, Cobalt, Gamma rays, Free radicals, Reaction kinetics, Recombination reactions, Organic compounds (Others), Aliphatic compounds.

Pyrex ampoules of gaseous 2-butyne (dimethylacetylene) were exposed to cobalt-60 gamma rays, and the hundred electron-volt yields of the lower molecular weight products are given. The radiation induced products were studied as a function of sample pressure and total dose. The products, which include hydrogen, methane, acetylene, propene, propyne, cis- and trans- 2-butene, butane, 1,2-butadiene, and vinylacetylene, are explained on the basis of ion-molecule and free radical reactions. Some mechanisms of product formation which are consistent with product distribution and magnitude of the yields are discussed. (Author)

AD-402 983 Div. 4, 26
(TISTM/AMS) OTS price $8.10

Boeing Co., Wichita, Kans.
EVALUATION OF CADMIUM PLATING SYSTEMS FOR HYDROGEN EMBRITTLEMENT,
by Theodore G. Kozan. 19 Sep 62, 82p. D3 4657
AF Proj. 6 61
Unclassified report

Descriptors: *Plating, *Cadmium, *Hydrogen embrittlement, Electroplating, Steels, Test methods, Tests, Experimental data, Tensile properties, Stresses, Fluoborates, Manufacturing methods, Cyanides, Sodium compounds, Cadmium compounds, Hydroxides, Carbonates, Nitrates, Iodides, Cadmium alloys, Titanium alloys, Titanium, Oxides.

A cooperative testing program to compare the hydrogen embrittlement characteristics of several available plating systems was conducted by ARTC Project 6-61. Eleven plating systems that showed promise of being non-embrittling were selected for evaluation. The plating systems evaluated approached the problem of reduction of hydrogen entry and/or subsequent removal from steel by: (1) Porous deposits and subsequent baking to remove and/or distribute hydrogen absorbed; (2) High efficiency (low hydrogen producing bath) with subsequent baking; (3) Suppression of hydrogen formation by additives; (4) Organic baths with no hydrogen formation; and (5) Organo-brush plating baths. The .003 in. notch root radius tensile specimen and the Douglas ring specimen evaluated in ARTC 13-59 were selected to test and evaluate the plating systems. (Author)

AD-403 265 Div. 4
(TISTM/ODN) OTS price $.50

Isomet Corp., Palisades Park, N. J.
PREPARATION OF HIGH PURITY ANHYDROUS FERROUS CHLORIDE.
Summary rept., 14 Mar 61-14 Sep 62,
by Horace W. Chandler and Joseph Malgiolio.
Mar 63, 14p.
Contract AF33 616 8187, Proj. 7353, Task 73530
ASD TDR62 1040 Unclassified report

Descriptors: *Iron compounds, Synthesis (Chemistry), Laboratory equipment, Energy, Heat of formation, Iron, Chemical analysis, Spectroscopy, Chemical reactions, Nickel, Impurities, Chlorides.

Several methods for preparing high purity anhydrous ferrous chloride were investigated. The technique finally developed involved the high temperature chlorination of iron sponge with anhydrous hydrogen chloride and collection of the sublimed ferrous chloride in a condenser held at such a temperature that ferric chloride did not condense. Ferric iron was undetectable in the final product and other impurities were well below the specified limits. Over 3 kilograms of high purity anhydrous ferrous chloride were prepared by this technique. (Author)

AD-403 343 Div. 4
(TISTM/PCR) OTS price $1.50

Technische Hochschule, Munich (Germany).
STUDIES OF HYDROGEN AND OXYGEN EVOLUTION AND THE INFLUENCE OF ABSORBED SUBSTANCES.
Final rept., 1 Mar 61-28 Feb 62,
by L. Kandler, H. Bickl, H. Feigl, and E. Hausler
Mar 63, 52p.
Contract AF61 052 305, Projs. 7022 and 7353, Task 735305
ASD TDR62 1067
Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: *Electrodes, *Porous metals, *Nickel, *Platinum, *Hydrogen, *Oxygen, Alternating current, Electrical impedance, Electrolysis, Sulfuric acid, Hydroxides, Potassium compounds, Cathodes (Electrolytic cell), Anodes (Electrolytic cell), Theory, Adsorption, Production.

This investigation has been concerned with hydrogen and oxygen evolution at electrodes and the influence of adsorbed substances. In this report AC measurements of the interface impedance prove to be suitable for studying adsorption phenomena on porous electrodes like platinated platinum and sintered nickel material. The impedance on platinum electrodes was evaluated for 8N H_2S_4 and 1N KOH solutions. Further investigations dealt with inhibition problems on highly activated porous nickel electrodes. Several alcohols were used as additives to 1N KOH. The applicability of the potentiostatic method of applying triangular voltages was examined on bright nickel electrodes. The electrolytes 8N H_2SO_4 in 1N KOH in general were stirred with purified nitrogen. The applicability of the potentiostatic method of triangular voltages to show the influence of inhibitors by applying the principle of Wagner-Traut was examined. (Author)

AD-403 346 Div. 4, 25
(TISTM/ODN) OTS price $2.60

National Research Corp., Cambridge, Mass.
HEAT OF FORMATION OF $LiAlH_4$.
Special rept.,
by Ludwig G. Fasolino. 26 Apr 63, 25p.
Contract Nonr360800, Proj. 54 1 0226
Unclassified report

Descriptors: *Lithium compounds, *Aluminum compounds, *Hydrides, Thermodynamics, Calorimeters, Aluminum, Lithium, Thermochemistry, Chemical reactions, Heat of reaction, Heat of solution, Chemical analysis, Spectroscopy, Magnesium, Calibration, Resistance (Electrical), Thermistors, Determination, Heat of formation.

The heat of formation of lithium aluminum hydride ($LiAlH_4$) was determined by measuring the heats of solution of aluminum, lithium, and lithium aluminum hydride in 4N HCl. The heats of solution were found to be: Al = -128.14 ± 0.39 kcal/mole; Li = -67.05 ± 0.53 kcal/mole; and $LiAlH_4$ = -168.56 ± 1.31 kcal/mole. From these data, the heat of formation of lithium aluminum hydride was calculated to be -26.63 ± 0.31 kcal/mole at 25 C. This value differs by 11% from the value of -24.08 ± 0.35 kcal/mole as determined by others, which is the value presented in circular 500 NBS. This latter value was the only one found by a search of the literature. The value determined in this work alters any chemical propulsion calculation utilizing this information. (Author)

AD-403 359 Div. 4
(TISTM/TCG) OTS price $.50

Army Chemical Research and Development Labs., Army Chemical Center, Md.
METHODS OF MICROANALYSIS. VIc OXYGEN DETERMINATION; THE PLATINUM-TUBE METHOD FOR FLUORINE-CONTAINING COMPOUNDS (A PRELIMINARY INVESTIGATION),
by Stewart S. Cruikshank. Feb 63, 15p.
ACRDL CRDLR3161
Unclassified report

Division 4 - CHEMISTRY

Descriptors: *Oxygen, *Oxygen compounds, *Halocarbon plastics, *Organic compounds, Fluorine, Platinum, Test methods, Halogens, Chemical analysis, Pyrolysis, Interference, Microanalysis, Organic compounds (Others)

A platinum pyrolysis tube is used in place of the customary quartz tube to determine oxygen in fluorine-containing compounds. The platinum-tube method shows good promise for eliminating the interference of fluorine in the oxygen determination. Further work is planned with other compounds and with carbon thoroughly purified before placing it in the platinum tube. (Author)

AD-403 376 Div. 4
(TISTM/SJR) OTS price $1.60

Olin Mathieson Chemical Corp., New Haven, Conn.
SOME REACTIONS OF DIALKYLAMINOBORONS,
by T. L. Heying and H. D. Smith, Jr. 8 May 63, 11p. TR14
Contract Nonr339500, Task NR356 431
Unclassified report

Presented at the Boron Nitrogen Chemistry Symposium, Duke University, 23-25 Apr 1963.

Descriptors: *Organic compounds, *Boron compounds, Aliphatic compounds, Organic sulphur compounds, Mass spectroscopy, Spectra (Infrared), Synthesis (Chemistry), Aromatic compounds.

Consideration of the established hydroboration, chloroboration and phenylboration reactions prompted attempts to extend this concept to aminoboration. Although addition to ethylenic bonds did not occur, it was found that addition to organic isocyanates and isothiocyanates readily occurred to give the expected boroureas. When applied to boron isocyanates and isothiocyanates however, disproportionations involving the boron substituents prevailed in good yield. Ultimately by such disproportions examples of the novel C6H5B(NR2)NC = O(=S) series of compounds were prepared. (Author)

AD-403 407 Div. 4
(TISTM/EJH) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE PREPARATION OF CARBON-14 LABELED TETRAMETHYLAMMONIUM BROMIDE,
by Andrew F. Smetana, Jerome Haberman and Thomas C. Castorina. Apr 63, 14p.
DA Proj. 503 05 021
PA TM1167
Unclassified report

Descriptors: *Labeled substances, *Bromides, *Ammonium compounds, Radioactive isotopes, Iodides, Chemical reactions, Surface properties, Adsorption, HMX, Test methods, Synthesis (Chemistry).

Carbon-14 labeled tetramethylammonium bromide was prepared via the condensation of C-14 methyl bromide with trimethylamine using high vacuum techniques. Unrecrystallized product yields, in the range of 100% of theory (based on methyl bromide), are independent of variations in excess quantitites of trimethylamine. C-14 methyl bromide is effectively derived from an intermixture of C-14 methyl iodide with methyl bromide in the ratio of 1:350. A series of preparations from aliquots of the stock CH3I/CH3Br mixture result in reproducible yields and specific activities of 1.8% average deviation. (Author)

AD-403 409 Div. 4
(TISTM/ODN) OTS price $3.60

Frankford Arsenal, Philadelphia, Pa.
ENGINEERING AND LABORATORY EVALUATION TO IMPROVE TEST PROCEDURES IN MILITARY SPECIFICATION JAN-P-670, STABILIZED RED PHOSPHORUS,
by George Norwitz, Joseph Cohen and Martin E. Everett. Mar 63, 18p.
FA T63 8 1
Unclassified report

Descriptors: *Phosphorus, Stability, Copper, Colorimetric analysis, Iron, Determination, Specifications, Quantitative analysis, Aluminum, Oxidation, Test methods, Bibliographies, Chemical analysis.

An improved colorimetric procedure for copper is proposed whereby the sample is dissolved in nitric acid and the solution evaporated to fumes of perchloric acid. Ammonium citrate, EDTA, and diethyldithiocarbamate are added, and the diethyldithiocarbamate complex is extracted with chloroform. An improved colorimetric procedure for iron is proposed whereby the sample is dissolved in nitric acid, the solution is evaporated to a small volume, and hydroxylamine hydrochloride, orthophenanthroline, and sodium citrate are added. It is recommended that the aluminum be determined by the 8-hydroxyquinoline procedure used by the National Bureau of Standards. The use of the classical magnesium ammonium phosphate method is recommended for the determination of total phosphorus. The oxidation test has been improved by use of an automatic recorder to measure the pressure and by use of a definite amount of water (0.5 ml) in the bomb. The methods previously proposed for yellow phosphorus and granulation are satisfactory. (Author)

AD-403 447 Div. 4
(TISTM/ODN) OTS price $6.60

Research Inst. Temple U., Philadelphia, Pa.
ADDITION AND SUBSTITUTION PRODUCTS OF OXYGEN FLUORIDES.
Annual progress rept. no. 3, 1 Jan-31 Dec 62, by A. G. Streng, A. D. Kirshenbaum and A. V. Grosse. 15 Jan 63, 64p.
Contract Nonr308501
Unclassified report

Descriptors: *Oxygen compounds, *Xenon, *Fluorides, Oxyfluorides, Electric discharges, Chlorine compounds, Sulfur compounds, Cryogenics, Synthesis (Chemistry), Platinum compounds, Krypton, Ammonia, Hydrocarbons, Oxygen, Water, Hydrogen, Sulfur, Iodine, Organic compounds, Bromine, Iodine compounds, Phosphorus compounds, Nitrogen compounds, Hydrogen compounds, Sulfides, Phosphorus, Crystals, Chemical reactions, Chemical compounds.

Chemical reactions of oxygen fluorides were studied to obtain addition products of high oxidizing power. The chemical characterization of dioxygen difluoride is given, and the reactions of formation of the intermediate compounds O2ClF3, O2BrF5 and O2SF6, as well as some others, are described. A new method (electric discharge) of preparing xenon tetrafluoride, XeF4, is given. The preparation of xenon oxyfluorides is indicated. Using the same method, at liquid air temperatures, it was possible to synthesize the first compound of krypton, i.e., krypton tetrafluoride or KrF4. It forms beautiful colorless transparent crystals, more volatile and less thermally stable than XeF4. (Author)

5. COMMUNICATIONS

AD-402 604 Div. 5
(TISTB/AW) OTS price $2.60

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
AN EVALUATION OF SPEECH COMPRESSION TECHNIQUES,
by Karl D. Kryter and Jay H. Ball. 25 Feb 63, 18p. BBN 978
Contract AF30 602 2235, Task 45350
RADC TDR63 90
Unclassified report

Descriptors: *Speech transmission, Intelligibility, Bandwidth, Analog-to-digital converters, Digital systems, Analog systems, Narrowband.

The results of previous technical reports are summarized and the results of tests of various recently developed speech compression systems are presented and analyzed. The results can be summarized as follows: (1) Semi-vocoders, operating at 9600 bits/sec, and channel vocoders, at 2400 bits/sec, will provide speech of adequate intelligibility and quality for most military communications. The voice quality of the semi-vocoders will usually be somewhat superior to that of the channel vocoders. (2) Results with as yet incomplete systems suggest that the Tarasoff-Daguet technique and the narrow-band spectrum sampling technique will ultimately provide speech intelligibility and quality comparable to that of the semi-vocoder. These systems will also require about 9600 bits/sec channel capacity during transmission. (3) Formant-tracking vocoders operating at about 1200 bits/sec can probably be developed to the point where they will provide speech intelligibility comparable to that from the channel vocoders operating at 2400 bits/sec. At the present time formant-tracking vocoders operating at 1000 bits/sec do not provide for adequate speech intelligibility. (4) Transmitting a restricted set of speech 'patterns,' from a larger set obtained from a digitized vocoder-type of speech analyzer-synthesizer, may provide a reduction in the information transmission rate normally required by that particular vocoder. Although this 'pattern' matching technique is still in its early experimental stages it appears that the normal bit rate for a given vocoder system may, by this technique, be reduced to 2/3 and possibly to 1/2 its normal magnitude. (Author)

AD-402 625 Div. 5
(TISTE/JBM) OTS price $10.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
NATURAL COMMUNICATIONS STUDY PHASE I, FEASIBILITY STUDY ON A RELIABLE POLAR HF COMMUNICATIONS SYSTEM,
by Geoffrey E. Hill, Sidney M. Bennett, and Claude J. Mazzola. 22 Apr 63, 128p. RAD TR63 13; Technical note no. 1
Contract AF30 602 2809 Proj. no. 4519, Task no. 451902
RADC TDR63 112
Unclassified report

Descriptors: *Radio communication systems, *Polar regions, *Ionospheric disturbances, High frequency, Reliability (Electronics), Programming (Computers), Propagation, Equations, Solar radiation, Reflection, Refractive index, Snell's law, Theory, Integral equations, Absorption, Electron density, Dipole antennas, Signal-to-noise ratio, Sensitivity, Radiofrequency interference, Atmospheric electricity, Extraterrestrial radio waves, Solar disturbances, Cosmic rays, Strategic Air Command, Radio transmission.

To establish methods by which propagation modes and field strength losses can be found, a number of formulations are developed. These are evaluated using vertical-incidence radio measurements Also, some experimental data on a test propagation path is analyzed. The observed values are in excellent agreement with the expected ones. Analysis is made of several ionospheric parameters. Analyses for a large number of disturbances in absorption, sporadic E, and F2-layer critical frequencies are given. Data on HF equipment and systems is presented. A completed system is presented for which the maximum possible reliability is found in an example situation. A traffic load is assigned to a hypothetical network during the height of a polar cap absorption event. The results show that communication can be maintained during the event, but at a reduced level. (Author)

AD-402 834 Div. 5, 8, 12
(TISTE/CAM) OTS price $12.50

Page Communications Engineers, Inc., Washington, D. C.
SPACE COMMUNICATIONS TECHNIQUES.
Final rept.
Apr 63, 1v. R9854A
Contract AF30 602 2403, Proj. 4519, Task 55097
RADC TDR63 111 Unclassified report

Descriptors: *Space communication systems, *Communication satellites (Passive), Radar tracking, Optical tracking, Doppler radar, Measurement, Radar cameras, Parabolic antennas, Focusing, Operation, Site selection, Radar transmitters, Radar receivers, Instrumentation, Antenna components, Antenna feeds, Radar duplexers, Radar equipment, Radar reflectors.

A description is given of the expansion of interim simplex space communication facilities at Rome, N. Y., and Trinidad to full duplex for use in communication experiments using passive satellites. Objectives of improved tracking accuracy and system gain were achieved by providing a conical scan feed and an optical tracking system at Rome, and new cooled, low-noise, doppler tracking receivers at both sites. Full duplex operation, deriving tracking information from received frequency while transmitting, and use of a highly sensitive receiving system in the same antenna with a megawatt-level radar tracking system were found practical. Tracking accuracy of the improved system proved satisfactory. Recommended improvements in the communications baseband demodulator, doppler-shift tracking, and passive radar tracking at Rome, N. Y. are discussed. (Author)

AD-403 339 Div. 5
(TISTP/MC) OTS price $6.60

Sylvania Electric Products Inc., Buffalo, N. Y.
FORWARD AIR CONTROLLER COMMAND PACK.
Final rept.
Mar 63, 56p.
Contract AF08 635 3326
TAC 1CAG2C7
Unclassified report

Descriptors: *Communication equipment, *Guerrilla warfare, Transmitter receiver, Walkie-talkies.

This final report covers the design and fabrication of two forward air controller command packs under contract AF08 635 3326. These command packs were required to provide an effective forward ground communication station capable of

being carried in by parachute and set up by one man. The command pack consists of four transceivers operating in the following frequency ranges: UHF-AM 250 - 350 mc; VHF-AM 110 - 140 mc, VHF-AM 38 - 50 mc and HF-SSB 4 - 20 mc. Each transceiver provides two crystal-controlled channels. Two transceivers can be monitored simultaneously by means of the special headset. Transceivers are individually powered, providing a four-hour mission of ground-to-air and ground-to-ground transmission/reception with a 25% duty cycle in transmit mode. Circuitry is completely solid state with the exception of one tube in the output stage of each of three of the units. The complete command pack with accessory case and accessories weighs approximately 40 pounds and is 11 inches wide, 10 inches high and 16 inches long. It is watertight and corrosion and shock resistant. (Author)

6. DETECTION

AD-403 489 Div. 6
(TISTP/MC) OTS price $1.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
DERIVATION OF EXACT FORMULAS FOR CORRECTING RADAR ANGLE DATA FOR ERRORS CAUSED BY NONPERPENDICULARITY OF THE RADAR AXES,
by William L. Shepherd. Mar 63, 7p. 12
DA Proj. 1G2 50206D241
Unclassified report

Descriptors: *Azimuth, *Radar equipment, Matrix calculus, Transformations, Mathematical analysis.

Exact formulas are derived for the correction of radar azimuth and elevation due to nonperpendicularity of the beam axis and azimuth axis to the elevation axis. Certain approximations are then obtained, and compared to the exact formulas. A method of combining these operations with coordinate transformations is given. (Author)

7. ELECTRICAL EQUIPMENT

AD-402 639 Div. 7, 25
(TISTE/JBM) OTS price $1.10

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
Bi-monthly status rept. no. 2, 15 Feb 63-15 Apr 63,
by W. B. Hall, R. J. Hill and J. J. O'Grady. 26 Apr 63, 4p.
Contract Nonr4012 00
Unclassified report

Descriptors: *Thermionic converters, *Electrodes, *Work functions, Cesium, Design, High temperature research, Aging (Materials), Electron bombardment, Heating, Rhenium, Ceramic materials, Tungsten, Niobium, Nickel, Molybdenum, Stainless steel, Tantalum, Iridium, Purification, Electric arcs, Thermionic emission.

Research was continued on the development of a low-work-function collector for thermionic converters operating in the "Ball-of-Fire" mode of the low-voltage arc. Changes in work function will be determined by comparative measurement in actual operation of converters under identically controlled conditions. Three approaches will be investigated: (1) the development of a material or surface which, when partially coated with cesium, gives a low-work-function, (2) the development of a low-work-function surface which is kept free of cesium, and (3) the addition of gas additives which, in conjunction with cesium on the base material, produces a low-work-function. (Author)

AD-402 656 Div. 7, 8
(TISTE/OHD) OTS price $4.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
A POROUS SUBSTRATE RESISTOR AIMED AT MINIATURIZATION OF METAL-FILM RESISTORS.
Interim development rept., 1 Jan-31 Mar 63,
by Theodore Matley. 31 Mar 63, 47p.
Contract NObsr87542, Proj. serial no. SR0080303
Unclassified report

Descriptors: *Fixed resistors, Ceramic materials, Porous materials, Porosity, Quartz, Metalation, Resistance (Electrical), Measurement, Manufacturing methods, Mercury alloys, Electric terminals, Copper alloys, Heat treatment, Microminiaturization (Electronics).

Porous ceramic substrate materials were evaluated in order to obtain a ceramic substrate material to replace the glass substrates. A ceramic substrate material was selected for use that is superior to any material that has been tried previously. Metallizing techniques have been further improved and a better understanding of the techniques has been obtained. Terminals of various types were tested for use on the porous substrates. Some of the terminals were applied before metallizing and others were applied after metallizing. A method was incorporated for use in the project. Methods of metallizing a substrate that has been cut from a porous disc are described and a metallizing procedure selected for use in the project. Tests were conducted on heat treatment of the metallized resistors. Resistors were monitored to show changes in resistance value during the heat treating cycle. Effect on high resistance values were compared to the effect on the lower resistance values. (Author)

AD-402 683 Div. 7
(TISTM/PCR) OTS price $6.60

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62,
by D. J. Doan and L. R. Wood. 31 Jan 63, 60p.
10
Contract DA36 039sc89188, Continuation of Contract DA36 039sc85396, Proj. 3A99 09 001
Unclassified report

Descriptors: *Storage batteries, Design, Effectiveness, Corrosion, Electrical impedance, Tables, Tests, Electrolytes, Anodes, Cathodes, Materials, Photographs, Manufacturing methods, Ammonia.

From continued investigation into the defining factors involved on cold activation, the conclusion is reached that cathode electrode fabrication and processing variables are causing the variance of 0.5 second to about 3 seconds. Separator development has resulted in increasing capacity and permitting use of thinner cells, both of which result in approximately doubling the energy per unit weight to a maximum of 4.51 watt-hours per pound. (Author)

AD-402 735 Div. 7, 12, 14
(TISTA/VGW) OTS price $8.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A PRELIMINARY DISCUSSION OF POSSIBLE APPLICATION OF FLUID-FILM BEARINGS TO AUXILIARY POWER A-C GENERATORS IN SPACE VEHICLES.
Final rept.,
by L. Licht. 24 Mar 61, 86p. F-B1809
Unclassified report

Subcontract to Jack & Heintz, Inc., Cleveland, Ohio, Contract AF33 616 6871.

Descriptors: *Spacecraft, *Auxiliary power plants, *Antifriction bearings, *Bearings, Liquids, Mercury, Sulfur, Rubdium, Aluminum compounds, Bromides, Turbines, Alternating current, Space environmental conditions, Pressure, Liquid metals, Lubrication, Temperature, Mathematical analysis, Films, Generators.

A preliminary, general discussion is given of fluid-film bearings for auxiliary power, AC-generators in space vehicles as a possible alternative to conventional, rolling-element-type bearings, the use of the latter being precluded due to relatively high temperature conditions and environmental factors. The generators, rated at 30 to 100 KVA at 24,000 rpm, are to be turbine-driven, self-contained units, having no external seals between rotating and stationary elements. The sealed containers are to withstand external pressures of 0 to 1 atmosphere and the ambient generator temperature is given as 600 F. Substances specified as possible working fluids for the closed-cycle turbine are: mercury, sulfur, rubidium and aluminum bromide. These fluids are considered as lubricants for the journal and thrust bearings of the generators and the feasibility is discussed regarding their use in the liquid and/or in the gaseous state, within a very roughly defined but limited temperature - pressure regime. (Author)

AD-402 815 Div. 7, 12
(TISTA/GEC) OTS price $3.60

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A THERMIONIC CONVERTER MODULE SUITABLE FOR LIQUID METAL HEATING.
Quarterly technical rept. no. 5, 15 Dec 62-1 Apr 63,
by W. B. Hall and J. J. O'Grady. Apr 63, 29p.
Contract AF33 657 8005, Proj. 8173, Task 817305 9
Unclassified report

Descriptors: *Thermionic converters, Heat transfer, Liquid metals, Thermal insulation, Ceramic materials, Auxiliary power plants, Space flight, Configurations, Effectiveness, Generators, Heating, Design.

Development continued of thermionic energy converters for space applications. Work continued on optimization of geometry and ceramic insulation between emitters and the heat source. This work will include the development of a thermionic generator module to develop 3.0 V of potential from a liquid metal heat source. A converter, Type A-1198B, achieved output power in excess of 40 w at specified conditions. A three-converter unit was designed to investigate the processing assembly procedures and unwanted low voltage arcs before fabrication of 3-V generator begins. (Author)

AD-402 838 Div. 7, 25
(TISTM/PCR) OTS price $7.60

Heliotek Div., Textron Electronics, Inc., Sylmar, Calif.
HIGH EFFICIENCY SILICON SOLAR CELLS.
Quarterly progress rept. no. 2, 15 Sep-15 Dec 62,
by Paul A. Berman, Roland J. Handy, and Geza P. Rolik. 15 Dec 62, 1v.
Contract DA36 039sc90777, Proj. 3A99 09 002
Unclassified report

Report on Investigation for the Improvement of High Efficiency Silicon Solar Cells for Terrestrial Applications.

Descriptors: *Solar cells, *Solar radiation, Solar panels, Resistance (Electrical), Costs, Nitrogen, Phosphorous, Ions, Mirrors, Circuits, Semiconductor devices, Equations, Mathematical analysis, Silicon, Measurement.

The purpose of this research is the development of high efficiency, low cost silicon solar cells. The objective is high yields, in the order of 70% of the cells having efficiencies in the range of 12 to 14% leading to a cell cost of $2.00 to $3.00 for a cell having dimensions of 1 cm by 2 cm. Both N+ on P and P+ on N cell structures are to be studied and the cells optimized for use in terrestrial environment with and without utilization of solar concentrators. (Author)

AD-402 844 Div. 7, 8
(TISTE/OHD) OTS price $9.10

General Electric Co., Schenectady, N. Y.
EVALUATION OF A MOLYBDENUM EMITTER, LOW VOLTAGE ARC THERMIONIC POWER CONVERTER.
Final rept.,
by E. A. Baum. Feb 63, 100p.
Contract AF33 657 8323, Proj. 8173, Task 817305 15
ASD TDR63 183
Unclassified report

Descriptors: *Thermionic converters, *Cesium electron tubes, Molybdenum, Cathodes (Electron tubes), Life expectancy, Tests, Temperature.

Results of life tests on the planar molybdenum-emitter cesium-vapor thermionic converter operating under steady-state conditions are presented along with a description of the life-test equipment. Transient data on the effect of variations in cathode, anode, and reservoir temperatures, as well as step changes in the load, are also presented. The steady-state life tests were performed at a cathode temperature of 1450 C on a 5 sq. cm. cathode area converter design with the thermal input being supplied by a radiation-type furnace in order to more closely simulate solar cavity heating. Seven converters were tested for extended periods with nominal power outputs of 1.5 watts/sq. cm. to 2.5 watts/sq. cm. The maximum life of the state-of-the-art structure on one converter was in excess of 3000 hours and four converters were operated

beyond 1000 hours without major degradation in the power output. In addition, the analyses of two converters which operated for 1200 hours and 1400 hours are discussed. (Author)

AD-402 884 Div. 7
(TISTE/AW) OTS price $2.25

Radio Corp. of America, Somerville, N. J.
INVESTIGATION OF NEW CATHODE-ANODE COUPLES FOR SECONDARY BATTERIES USING MOLTEN SALT ELECTROLYTES.
Final rept. Nov 61-Nov 62,
by E. F. Uhler, G. Stockdale, P. Ritterman, and G. S. Lozier. Jan 63, 71p.
Contract AF33 657 7758, Proj. 8173, Task 817304
ASD TDR63 115
Unclassified report

Descriptors: *Storage batteries, Theory, Electrolytes, Salts, Fluorides, Chlorides, Sulfates, Ceramic materials, Cathodes (Electrolytic cell), Anodes (Electrolytic cell), Selection, Coupling circuits, Melting, Batteries and components, Materials.

An investigation of the most direct and systematic approach in selecting the most promising materials for the development of higher capacity secondary batteries for space applications is reported. The experimental approach, materials, and necessary precautions required in molten-salt technology are summarized. Advantages and disadvantages of the various molten salt electrolytes considered are presented. Experimental procedures and couple materials investigated are discussed. The experimental results for the molten-salt cells investigated are presented. Data are presented for cells with fluoride, chloride and sulfate molten-salt electrolyte. Objectives and results of a ceramic separator study phase of the program are included. The design of a molten-salt secondary battery which was constructed during the course of the program is described, along with fabrication procedures of this battery. Theoretical calculation for the initial heat input versus heat output and the heat loss due to cell radiation is presented. (Author)

AD-402 981 Div. 7
(TISTM/PCR) OTS price $2.50

Gulton Industries, Inc., Metuchen, N. J.
SILVER-CADMIUM BATTERY PROGRAM.
Final rept., 23 Jan 61-1 Oct 62,
by G. Rampel, J. Liska, and R. C. Shair.
Mar 63, 106p.
Contract AF33 600 42397, Proj. 8173, Task 817304 11
WADD TR61 131, pt. 2
Unclassified report

Descriptors: *Batteries & components, *Electrodes, Cadmium, Oxides, Battery separators, Nylon, Tests, Temperature, Electric currents, Electric potential, Electrolytes, Pressure, Degradation, Acceleration, Vibration, Impact shock, Pictures, Tables, Silver.

A research and development program leading to improved, long life, sealed silver-cadmium batteries for aerospace applications is discussed. A silver electrode was utilized which yielded up to 50% of its capacity at the AgII oxide voltage plateau and the balance at the AgI oxide voltage plateau. Several separator systems were tested with regard to obtaining maximum cycle life. The best separator combination consisted of single layers of Dynel-Polypor WA (coarse nylon base)-Fibrous sausage casing - V, each enclosing the positive electrodes in the order listed. Sixty 7 ampere-hour cells, the AG-7HS, were life tested in a 90 minute cycle at several depths of discharge and at several temperatures, utilizing constant current and constant voltage recharge methods. Three thousand cycles were achieved at a 17% depth at 78 F. Charging problems are discussed. It was found that a charge routine consisting of a combination of constant current followed by constant potential was better than constant current charging or constant potential charging alone. (Author)

AD-403 152 Div. 7, 8
(TISTE/OHD) OTS price $8.10

General Electric Co., Auburn, N. Y.
THE RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63.
31 Mar 63, 1v.
Contract NObsr87648, Proj. SF013 11 05
Unclassified report

Descriptors: *Rectifiers, *Semiconductor devices, Silicon, Electric potential, Electric currents, Power equipment, Design, Electronic switches, Crystal rectifiers.

A study of the relationship between SCR design parameters and electrical characteristics has been made and a discussion of the pertinent points is presented. A computer analysis of the effects of differing sizes of internal emitter shorts has been completed and is summarized. A number of the test procedures and the nomenclature which is used are included. (Author)

AD-403 356 Div. 7, 8
(TISTE/JWS) OTS price $6.60

Burndy Corp., Norwalk, Conn.
RESEARCH, DESIGN AND DEVELOPMENT FLAT FLEXIBLE CABLE CONNECTOR.
Final rept.,
by Robert G. Knowles. 18 Feb 63, 65p.
Contract DA36 039sc90721
Unclassified report

Descriptors: *Electric cables, *Electric connectors, Tolerances, Electric insulation, Dielectric properties, Electric terminals, Microminiaturization (Electronics).

This contract was presented to a connector manufacturer in order to promote the development of better methods of terminating Flat Flexible Cable, and inspiring original approaches to simplify its installation. The primary requirements for the new type connector were that the connector be capable of being installed in the field with a minimum of tooling; and, that it provide a highly reliable environmentally sealed connector. Secondary requirements were that the connector mate with, or be adaptable to, the ultraminiature printed circuit connectors; that it be suitable for rack and panel applications, and that it be fitted with or be capable of being fitted with latches to permit its use as an unmounted disconnect. This report summarizes the various changes from the original concept, and the reasons for them; the research work on the insulation piercing concept; and, a brief analysis of the results of the tests. (Author)

AD-403 400 Div. 7, 8
(TISTE/CAM) OTS price $8.60

General Electric Co., Holyoke, Mass.
HIGH POWER, HIGH VOLTAGE, AUDIO FREQUENCY TRANSFORMER DESIGN MANUAL.
Quarterly rept. no. 3, 1 Jan-31 Mar 63.
31 Mar 63, 1v.
Contract NObsr87721, Proj. SR008 08 02, Task 9599
Unclassified report

Descriptors: *Transformers, Design, Electric potential, Extremely low frequency, Very low frequency, Electrical impedance, Mechanical properties, Electric insulation, Dielectric properties, Circuits, Packaged circuits, Electrical properties, Magnetic properties, Tables, Test methods, Audiofrequency.

Research is presented on the investigation and verification of data and design methods used to design high power, high voltage, audio frequency transformers. Ratings of these transformers fall within the following characteristics: (a) peak power levels from 15 to 350 kilowatts; (b) operating frequencies from 20 to 20,000 cps; (c) peak voltage ratings from 4,000 to 28,000 volts; and (d) impedance levels of 300 to 3,000 ohms primary and 10 to 1,2000 ohms secondary. The scope of this work includes a discussion of the mechanical and packaging aspects of the design, the insulation materials and processing of those materials, and the electrical and magnetic characteristics of audio frequency transformers. (Author)

AD-403 453 Div. 7, 26
(TISTE/OHD) OTS price $1.60

Hi-Q Div., Aerovox Corp., Olean, N. Y.
PRODUCTION ENGINEERING MEASURE FOR ROLLED CERAMIC CAPACITORS.
Quarterly rept. no. 7, 9 Dec 62-9 Mar 63,
by S. H. Thompson. 9 Mar 63, 18p.
Contract DA36 039sc85963
Unclassified report

Descriptors: *Ceramic capacitors, *Manufacturing methods, Capacitors, Machines, Electrodeposition, Electrodes.

The method of electroding was changed from transfer wheel to silk screening during the reporting period. The operation of the silk screen machine was evaluated and sample units were, and are being, made using the existing equipment. These units are being evaluated to check the performance of the different pieces of equipment. (Author)

AD-403 465 Div. 7, 8
(TISTE/OHD) OTS price $3.60

Sorensen and Co., Inc., South Norwalk, Conn.
SIGNAL CORPS BATTERY CHARGING SYSTEM PP2386.
Final engineering rept.,
by Stanley Ladouceur, 20 July 61, 1v. CJM32
Contract DA36 039sc78058
Unclassified report

Descriptors: *Battery chargers, Reports, Tests, Magnetic amplifiers, Vibration, Electric switches, Handbooks.

The system is composed of three assemblies -- the power supply, the control and distribution panel, and twelve battery charging stations -- arranged within a 12 ft. by 4 ft. rectangle. The power supply and control panel form one 4 ft. end, and the twelve stations are arranged, six per side, along the 12 ft. length. The over-all system height is 5 ft. (approx.). The power supply is a self contained, regulated unit mounted on casters, and can, therefore, be used for purposes other than battery charging. The output of the supply is 24 to 32 volts d.c. at 0 to 200 amperes d.c. It fits into a cutout in the control and distribution panel, to which it can be mechanically fastened. The output of the supply is fed to the control and distribution panel and from there to the twelve charging stations. The control panel contains facilities for adjusting and monitoring the voltage and current to each station. Capabilities: simultaneous charging of twelve 24 volt batteries within an 8 to 12 hour period under a normal ambient temperature of 20 C. (A 24 volt battery is defined as any battery, or batteries series connected, having a nominal voltage of 24, and a capacity of 150 ampere-hours at the 20 hour rate). (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-402 603 Div. 8
(TISTE/OHD) OTS price $3.60

Chalmers U. of Tech. (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. 8: REFLECTION OF ELECTROMAGNETIC WAVES FROM A DIELECTRIC, PLANE LAYER, VARYING PERIODICALLY IN SPACE AND TIME.
by A. R. Thomasson. 1962, 1v. CUT 33
Contract AF61 052 451
AFCRL 63 82 Unclassified report

Descriptors: *Electromagnetic wave reflections, *Dielectrics, Electromagnetic waves, Propagation, Field theory, Partial differential equations, Mathematical analysis, Theory, Nonlinear systems.

The purpose of the investigation is to study the interaction between an obliquely incident, plane electromagnetic wave and a plane, semi-infinite dielectric medium, the dielectric constant of which contains a space- and time-varying component. Let us first consider a medium, the dielectric constant of which is periodically fluctuating only in time. It can then be shown that one gets parametric resonance when the angular frequency, w1, of the incident electromagnetic wave is equal to half the angular frequency, w2, of the forced, or pumped, variations in the disturbed medium. However, when the disturbance is propagating, this resonance condition becomes altered. We find, that in order to get resonance effects certain relations depending on the angle of incidence and the phase velocities of the incident and pump-wave, predicted by Rydbeck, must be fulfilled. The harmonic time variation of the dielectric medium produces transmitted and reflected waves (non-linear modes) on the characteristic frequencies w1 ± nw2, where n = 0, 1, 2 ... The angles of reflection and transmission will be functions of the propagation parameters of the two waves as expressed by a generalization of Snell's law. The investigation, finally, also includes the case where losses are taken into account. (Author)

AD-402 623 Div. 8
(TISTE/CRJ) OTS price $23.50

Department of Defense, Washington, D. C.
PROPERTIES OF STRIP TRANSMISSION LINE,
by A. D. Sills.
Unclassified report

Descriptors: *Transmission lines, Electrica impedance, Measurement, Determination, Test methods, Theory, Wave transmission, Capacitance, Errors, Computer logic, Waveguides, Transformations (Mathematics), Attenuation, Coaxial cables, Oscilloscopes.

Contents:
Determination of stripline characteristic impedance
Bibliography
Appendices
Size and cost calculations for a 1000 logical element computer
The TEM mode
Elements of complex variable theory and a discussion of the Schwarz-Christoffel transformation
Determination of the capacitance of stripline
Polygonal cross section

AD-402 655 Div. 8
(TISTE/OHD) OTS price $2.60

General Electric Co., Owensboro, Ky.
Z-5267 CERAMIC TETRODE, 40 WATTS AT 3000 MC.
PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by V. W. Amoth. 28 Feb 63, 21p.
Contract DA36 039sc86735
Unclassified report

Descriptors: *Tetrodes, Ceramic materials, Radiofrequency power, Manufacturing methods, Electron tube parts, Cathodes (Electron tubes), Aging (Materials), Sublimation, Test methods, Cavity resonators, S band.

A cathode sublimation problem caused a change in all chemical cleaning and plating baths. Considerable analysis work is in progress to trace the sublimation source. The first exhaust set is in operation and operates satisfactorily except for a problem in the temperature controller. The amplifier cavity was reworked and higher power output obtained. Oscillator cavity work is continuing, for RF aging and life test purposes. (Author)

AD-402 670 Div. 8
(TISTE/OHD) OTS price $5.60

Radio Corp. of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 3, 1 Dec 62-28 Feb 63,
by G. Hodowanec, C. Bacher and R. McMurrough. 28 Feb 63, 51p.
Contract NObsr87535, Proj. no. SR008 03 4, Task no. 9293 Sub.
Unclassified report

Descriptors: *Traveling-wave tubes, X band, Noise (Radio), Manufacturing methods, Helixes, Magnets, Limiters, Detectors, Measurement, Waveguide couplers, Electron guns, Focusing, Video amplifiers, Multiple operation.

The major effort was expended in the experimental evaluations of the design approaches proposed for obtaining a simple, but reliable, tube design meeting the program objectives. Emphasis was placed upon the compression-sheath-supported helix structures and associated transducer systems, the magnetic circuits, the limiter-section design parameters, and the video-detection circuitry. While some design refinements are still contemplated, the over-all final tube design has been established and will now be evaluated in hybrid glass-metal-ceramic structures and also completely integrated metal ceramic structures. Meanwhile, metal-ceramic technology studies, aimed at simplifying and increasing the reliability of the seals, continues. In addition, the final tube design packaging is being worked out and necessary vendor-provided parts are being ordered in preparation for the fabrication of the ten tubes desired. (Author)

AD-402 676 Div. 8
(TISTP/FR) OTS price $8.60

New York U., Coll. of Engineering, N. Y.
COMPUTER CONSTRUCTION AND EVALUATION OF LONG BURST-ERROR CORRECTING CODES,
by J. J. Metzner. 31 Jan 63, 91p. Scientific rept. no. 12
Contract AF19 604 6168, Proj. 4610, Task 461003
AFCRL 63 28
Unclassified report

Descriptors: *Coding, Errors, Programming (Computers), Communication theory.

A specific method of programming a digital computer to construct and evaluate codes suitable for use in a burst-error correction decoding scheme, described in the Tenth Scientific Report (AD-286 304), is presented. Two (100,50) codes of this type were constructed using the methods described. One is found capable of correcting uniquely all bursts of length 21 or less. The method used to evaluate burst-error correcting capabilities is applicable to any group code, not just the class under consideration. Memory limitations have restricted the present program to code lengths not exceeding 105 digits, of which at most 63 may be check digits. (Author)

AD-402 677 Div. 8, 25, 26
(TISTM/PCR) OTS price $2.60

Radio Corp. of America, Somerville, N. J.
GALLIUM ARSENIDE EPITAXIAL FILM GROWTH.
Interim technical documentary progress rept. no. 2, 15 Dec 62-15 Mar 63,
by N. Goldsmith. Apr 63, 23p.
Contract AF33 657 9179
ASD TR7 995, vol. 2
Unclassified report

Descriptors: *Epitaxial growth, *Arsenides, *Films, Gallium compounds, Manufacturing methods, Vapors, Surface properties, Finishes and finishing, Thickness, Measurements, Driers (Apparatus), Crystal growth, Sulfur, Hydrochloric acid, Impurities, Oxygen, Tellurium.

Oxygen was shown to be a major factor in the formation of surface imperfections previously observed. The source of the oxygen in the system was traced to a fault in the palladium furnace. Analyses of commercial hydrochloric acid samples from several sources have been made showing that impurities up to 0.3% (volume) are frequently present. Doping with sulfur in the form of sulfur monochloride yields maximum

donor concentrations of 3.7 x 10 to the 18th power/cubic cm. Attempts to achieve higher doping levels with tellurium were not successful. Non-destructive techniques for the measurement of carrier concentration are presented covering the range 10 to the 15th power to 10 to the 19th power for n-type material. Evidence is presented to show that the layers have doping gradients near the interface. Details are given of the procedure for surface preparation, including the etch composition, rotation speed, etchrate and final rinsing and drying of the wafer. An evaluation of the growth rates is also given. (Author)

AD-402 682 Div. 8
(TISTE/JWS) OTS price $6.60

Physical Science Lab., New Mexico State U., University Park.
THE PSL/NMSU ANTENNA RANGE,
by H. W. Haas. 1 Apr 63, 55p.
Contracts NAS5 503, NAS5 1032, NORD16710, and Grant DA ORD31 124 60G66
Unclassified report

Report on An Antenna Radiation Pattern Measuring Research Instrument.

Descriptors: *Antenna radiation patterns, *Test facilities, Propagation, Antenna masts, Test equipment, Test methods, Instrumentation, Measurement, Antennas.

This report covers the general aspects of a multi-purpose antenna radiation pattern measuring instrument designed, fabricated, instrumented and placed in operation during the early part of 1962. Initial planning began in late 1958 when the need for such an instrument was evident to support present and future electromagnetic programs of national interest. (Author)

AD-402 697 Div. 8, 26
(TISTE/JWS) OTS price $2.60

Autonetics, Downey, Calif.
UNIFORM WORK FUNCTION CATHODE STUDIES FOR THERMIONIC CONVERTERS.
Quarterly rept. no. 3, 12 Jan-12 Apr 63,
by M. N. Huberman and R. A. Mohr. Apr 63, 29p.
Contract AF33 657 8726
Unclassified report

Descriptors: *Thermionic converters, *Cathodes (Electron tubes), Analysis, Tests, Microstructure, Vapor plating, X-ray absorption analysis, Surface properties, Crystal structure, Molybdenum, Electron microscopy, Manufacturing methods.

X-ray analysis of vapor deposited molybdenum shows that either (111) or (100) preferred orientations can be obtained. Further work indicates that precise control of impurities is needed before reproducible results can be obtained. Cathodes having (111) orientations were produced using vapor deposition techniques. Methods of polishing cathode surfaces were studied. X-ray studies show that heat treatment is adequate to restore the preferred orientation at a mechanically polished surface. The reproducibility of performance of test diodes was established by comparison of current data with data from previous work. Construction of an emission electron microscope for cathode work function distribution studies is in progress. Preliminary work has been done with electron mirror microscope. (Author)

AD-402 716 Div. 8, 26
(TISTE/OHD) OTS price $12.00

Army Electronics Materiel Agency, Philadelphia, Pa.
PROCEEDINGS MICRO-MODULE INDUSTRY CONFERENCE, A SERIES OF PAPERS PRESENTED AT THE FIRST MICRO-MODULE INDUSTRY CONFERENCE, PHILADELPHIA, PENNSYLVANIA, SEPTEMBER 12-13, 1962.
1962, 1v.
Unclassified report

Descriptors: *Manufacturing methods, *Microminiaturization (Electronics), *Modules (Electronics), Quality control, Jigs, Capacitors, Metal coatings, Ceramic materials, Mica, Molybdenum, Symposia.

Contents:
Mechanized assembly system for micromodules
Module assembly methods and requirements
Incoming inspection
Test jigs and fixtures
Handling of microelement components
Some problems associated with meeting the current 'land and lead' specifications and their solutions
Land and notch metallizing on multilayer micromodule capacitors
Materials, metallization, tinning and handling
Thermal conditioning of ceramic materials
Glass-bonded mica as substrate material
Calculations predicting physical and electrical characteristics of molybdenum films on microelement wafers
Metallizing wafers
Mounting components on wafers
Plans for using micromodules in Army equipment
Status and plans for specification, qualification approval and standardization
A review of the micromodule program

AD-402 731 Div. 8
(TISTE/JBM) OTS price $4.60

General Electric Co., Owensboro, Ky.
DEVELOPMENT OF AN IMPROVED JAN 6299.
Quarterly progress rept. no. 5, 17 Sep-31 Dec 62,
by D. L. Cook. 31 Dec 62, 1v.
Contract DA36 039sc85953
Unclassified report

Descriptors: *Electron tubes, *Manufacturing methods, Humidity, Anodes (Electron tubes), Ceramic materials, Aluminates, Cathodes (Electron tubes), Copper, Life expectancy, Degasification, Seals (Stoppers), Exhaust systems, Coatings, Reliability (Electronics), Processing, High temperature research, Gold, Plating, Nickel, Mass spectroscopy, Configuration, Gas analysis.

Efforts continued on the evaluation of advanced tube manufacturing techniques and their application to the fabrication of a more reliable and better performing tube. Tests indicated that tubes must have hard solder anodes to withstand 225 C anode seal temperature consistently. The mass spectrometric gas content analysis has shown that the majority of tubes failing the humidity test do so because of the introduction of hydrogen into the tube. The source of the hydrogen has not been isolated. (Author)

AD-402 734 Div. 8
(TISTE/JWS) OTS price $8.60

Schellenger Research Labs., Texas Western Coll., El Paso.
IMPROVEMENT OF SRL GROUND MICROPHONES AND

ASSOCIATED ACTIVITIES IN CONNECTION WITH DEVELOPMENT OF AN IMPROVED ACOUSTIC DETECTION SYSTEM.
Final rept.,
by Eddie W. Chew and Leonard L. Chapin. Apr 63, 1v.
Contract DA29 040ord2410
Unclassified report

Descriptors: *Microphones, *Acoustic detectors, *Microphones, Pressure, Phase measurement, Calibration, Microbarometric waves, Pulse modulation, Temperature, Frequency, Electric potential, Acoustic filters, Electric insulation, Styrene plastics, Expanded plastics, Frequency modulation, Capacitance.

A capacitor microphone was tested with temperature, humidity and pressure effects considered. Improvements stemmed from increased demand upon its characteristics and from inadequacies found during initial field use. An important area studied was a reasonably accurate method of checking the sensitivity calibration of the microphone. Ideally, it should require minimum equipment, be inexpensive, and be accurate within reason. Temperature, humidity, and pressure (altitude) effects on various methods were studied. The calibration described provides a good compromise among the above factors. Atmospheric effects either do not become a consideration or they can be correlated directly to a correction factor. Considerable test and comparison data was obtained on the Mark II Microbarograph. It was convenient to give this microphone the same tests as the capacitor microphone and the results were informative. Several alternate methods of signal handling were considered. The most promising three were an FM system, a Pulse Deviation Modulation (PDM) system and a Bridged-T system. Sufficient sensitivity could be obtained from each if a suitable, inexpensive detector system could be developed. (Author)

AD-402 739 Div. 8
(TISTE/JWS) OTS price $10.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM.
Quarterly rept. no. 19, 1 Oct 62-1 Jan 63, 1 Jan 63,.
Contract DA36 039sc75968
Unclassified report

Descriptors: *Modules (Electronic), *Semiconductor devices, Reliability (Electronics), Resistors, Capacitors, Transistors, Diodes (Semiconductor), Encapsulation, Coatings, Radio transmitters, Radio receivers, Printed circuits, Soldered joints, Test methods, Computers, Temperature, Life expectancy, Soldering, Semiconducting films, Heat transfer, Microminiaturization (Electronics).

The objectives of this original program was the establishment of the feasibility and reliability of micro-modules and of a limited range and selection of micro-elements. Certain subassemblies, constructed with micro-modules, and a micro-modular version of the AN/PRC-34 helmet receiver were also required. Investigation and development of additional types of micro-elements needed and improvement of processes for constructing micro-modules are also included. Development of Radio Set AN/PRC-51 including a helmet receiver, Receiver, Radio R-1018( )/PRC-51 and Transmitter, Radio T-792( )/PRC-51; the development of a General Purpose Computer Set for Digital Data (MicroPac); and the design and construction of micro-modules for the above equipments. Processes, techniques, and facilities, are being planned and established for mechanized production of microelements and modules, which will be compatible with a production rate of 25,000 micro-modules per month. (Author)

AD-402 757 Div. 8
(TISTE/JWS) OTS price $1.60

Alabama U. Research Inst., Huntsville.
THE GROOVE GUIDE, A LOW LOSS WAVEGUIDE FOR MILLIMETER WAVES,
by F. J. Tischer. Jan 63, 15p. RR2.
Unclassified report

Presented at the Millimeter and Sub-millimeter Conference of the Institute of Radio Engineers at Orlando, Florida, on January 7, 1963.

Descriptors: *Waveguides, Electromagnetic properties, Mathematical models, Attenuation, Electric fields, Dielectrics, Millimeter waves, Electrical properties.

A new waveguide for the low-loss transmission of millimeter waves is presented. The guide consists of two parallel conducting walls with grooves in the central region of the guide cross-section. The grooves run along the guide in the direction of the wave propagation. It is shown that the waveguide, if excited in the TE-wave mode, has similar properties as the H-guide, which contains a dielectric slab between the conducting walls in the center. The new guide is characterized by an exponential transverse decrease of the field distributions in direction from the center and by low attenuation. Theoretical considerations dealing with the field distribution and the data of the guide are presented. (Author)

AD-402 776 Div. 8
(TISTP/MC) OTS price $12.00

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A STUDY OF WAVE PROPAGATION ON HELICES,
by Paul William Klock. Mar 63, 151p. TR68
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: *Helixes, *Electromagnetic waves, Propagation.

The determinantal equation for a narrow helix is derived by two methods, and complex-valued solutions for the phase constant are obtained. The complete k - beta diagram (Brillouin diagram) is given as a function of tape width and pitch angle. In order that the solutions be continuous functions of k and beta, it is necessary to change branches of the square root which appears in the determinantal equation. A discussion of solutions which are physically admissible as complex wave solutions is given, and the phase constants corresponding to the complex wave solutions are used to represent the current on a helix. Two source problems are investigated, one an infinite helix, the other a finite helix. Comparison with experiments is made with good agreement. (Author)

AD-402 885 Div. 8
(TISTE/JWS) OTS price $.75

Harry Diamond Labs., Washington, D. C.
TRANSISTORIZED DC-TO-DC CONVERTERS EMPLOYING PIEZOELECTRIC TRANSFORMERS,
by Floyd Allen. 18 Mar 63, 27p. TR1116
Proj. 94994
Unclassified report

Descriptors: *Power supplies, *Transistors, Barium compounds, Titanates, Transformers, Electric currents, Electric potential, Piezoelectric transducers, Piezoelectric crystals, Switching circuits, Inverters.

A transistorized dc-to-dc converter has been designed using a ceramic transformer. This converter is particularly adaptable to equipment used in measuring magnetic fields. The ceramic transformer provides further advantages of reduced size and complexity over flyback type pulse and resonant rf transformers, which require the use of many turns of well insulated wire. A prototype model, built to convert 28 v dc to 2200 v dc at 20 microamperes, operates satisfactorily from -35 degrees centigrade to 75 degrees centigrade and shows no substantial change in output after continuous operation for 3600 hr. Included is a procedure for the design of a transverse transformer showing the voltage amplification to be a function of piezoelectric coefficients and transformer geometry. (Author)

AD-402 886 Div. 8
(TISTE/JWS) OTS price $1.25

General Telephone and Electronics Labs. Inc., Bayside, N. Y.
A SOLID-STATE SELF-SCANNING DISPLAY DEVICE.
Final rept.,
by M. S. Wasserman. 30 Nov 62, 39p. TR62 204.18
Contract AF30 602 2524, Proj. 4506, Task 450601
RADC TDR 62 601

Unclassified report

Descriptors: *Display systems, Piezoelectric transducers, Ceramic materials, Titanates, Lead compounds, Zirconates, Resistance (Electrical), Electrodes, Electric currents, Electric potential, Sintering, Electrical conductance, Electric insulation, Mechanical waves, Electroluminescence.

Investigation is described of materials for use in a solid-state electroluminescent display device in which the electric field for activation of the electroluminescent layer is provided by elastic waves, propagated through a piezoelectric ceramic plate serving as the substrate for display. The first phase was devoted to a search for improved piezoelectic ceramics. In the second phase of the investigation, emphasis was placed on an investigation of the problems associated with integration of the piezoelectric, nonlinear resistive and electroluminescent materials into complete display structures. Brightness and resolution of the display are limited by the fact that the electroluminescent layer exhibits a nonlinear resistive characteristic at high field strength. The expected effect of improved propagation characteristics of hot-pressed ceramics has also been assessed. Finally, it has been shown that a significant increase in brightness can be achieved if the display design is revised. Its output pulses would be used to gate power from an independent source. (Author)

AD-402 887 Div. 8
(TISTE/JWS) OTS price $1.00

RCA Defense Electronic Products, Camden, N. J.
EVAPORATED THIN-FILM DEVICES.
Scientific rept. no. 2, 1 Dec 62-28 Feb 63,
by P. K. Weimer, H. Borkan, and F. V. Shallcross.
10 Mar 63, 28p.
Contract AF19 628 1617, Proj. 4608 Task 460804
AFCRL 63 67

Unclassified report

Descriptors: *Transistors, *Semiconducting films, Cadmium alloys, Selenium alloys, Electrical conductance, Diodes (Semiconductors), Sulfur compounds, Electric potential, Electric currents, Dielectric properties, Bandpass amplifiers, Electrodes, Vapor plating, Measurement, Mathematical prediction, Zinc compounds, Oxides, Integrated circuits, Semiconductor devices.

An improved electrode arrangement for the insulated-gate thin-film transistor has yielded higher performance and greater ease of fabrication. On-to-off current ratios of ten to the seventh power, input resistance exceeding ten to the tenth power ohms, and gain-bandwith products of 25 megacycles have been obtained with polycrystalline cadmium sulfide films. By depositing all electrodes on top of the-semiconductor, maximum freedom in processing the semiconductor layer is obtained. A novel type of field-effect diode is described. (Author)

AD-402 890 Div. 8
(TISTE/JWS) OTS price $8.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
TRANSIT SATELLITE PRECISION OSCILLATORS AND THEIR TEMPERATURE CONTROL,
by J. B. Oakes, W. J. Billerbeck and K. F. Read.
Jan 63, 84p. CM1025
Contract NOw62 0604

Unclassified report

Descriptors: *Crystal oscillators, Crystal ovens, Crystal holders, Thermostats, Vacuum apparatus, Thermal insulation, Test methods, Frequency shift, Measurement, Satellites (Artificial), Transistors.

Four years have passed since the initiation of the Transit navigational satellite program at APL. During this time, the stable oscillator which controls the RF signals transmitted from the satellite has undergone continuous refinement and improvement. At the present time, a design exists which appears to fulfill all the requirements for future operational use. This report describes the history of this development, and covers the electronic and thermal considerations which enter into the design. All pertinent schematic and mechanical drawings have been included to make the report as complete as possible. (Author)

AD-402 928 Div. 8
(TISTE/JWS) OTS price $3.60

Army Signal Radio Propagation Agency, White Sands Missile Range, N. Mex.
TELEMET COMPANY MODEL 1483-A17 VHF/FM TRANSMITTER SPECTRUM UTILIZATION CHARACTERISTICS,
by Virgilio Cisneros. 1 Apr 63, 35p. TM1 4 63T

Unclassified report

Descriptors: *Telemetering transmitters, Noise (Radio), Test methods, Military requirements, Stability, Frequency modulation, Temperature, Radio signals, Crystal oscillators, Very high frequency.

The spectrum utilization characteristics of a VHF/FM telemetering transmitter were determined to facilitate the assignment of frequencies on an interference free basis. Operational characteristics were examined empirically against the parameters of operating time, supply voltage variations, and temperature. Interference char-

acteristics (spurious emanations) were also examined. The frequency stability met the requirements of ±0.01% for all tests with one exception. All antenna conducted spurious emanations met the requirements of 59 db down from fo (252.4 mcs). It is recommended that the VHF/FM transmitter be authorized for operational use at White Sands Missile Range after certain provisions are met. (Author)

AD-402 939 Div. 8
(TISTE/JWS) OTS price $1.60

RCA Defense Electronic Products, Burlington, Mass.
PROGRAM 706. TASK 2. INVERTERS EVALUATION.
Quarterly progress rept. no. 1,
by J. L. Freedman and R. Rubin. 20 Apr 63, 10p.
Contract AF04 695 273
SSD TDR63 91, vol. 2

Unclassified report

Descriptors: *Inverters, *Switching circuits, Tests, Radio interference, Electric currents, Electric potential, Distortion, Oscillators, Voltage regulators, Transients, Spacecraft, Rectifiers, Power supplies, Diodes (Semiconductor).

Purpose of the work under this task is to prepare for delivery 2 each 1400 VA, and combination 400 VA and 25 VA inverters designed and in process of fabrication and test under the previous space vehicle feasibility test demonstration program. Redesign and rework required to provide functional integrity and evaluation to determine performance parameters is also to be performed. Modifications to reduce electrical interference and refinement of shut off circuitry have enabled completion of work on the 1400 VA inverters and performance has been determined to be nominal with respect to original design goals. (Author)

AD-402 953 Div. 8
(TISTP/RD) OTS price $1.10

Mitre Corp., Bedford, Mass.
REDUCTION OF SIDE LOBES AND POINTING ERRORS IN PHASED ARRAY RADARS BY RANDOMIZING QUANTIZATION STEPS,
by W. J. Albersheim. Apr 63, 6p. TM3435
Contract AF33 600 39852
ESD TDR63 155

Unclassified report

Descriptors: *Antenna lobes, *Radar antennas, Phase shifters, Phase studies, Reduction.

In many array radars the composite beam is directed by quantized phase shifters. Regular sequence of quantization errors enhances sidelobes and pointing errors. It is recommended to break up the regularity by small, known nonlinear and preferably quasi-random initial phase deviations in the array elements. This reduces the lobes and pointing errors for a given number of quantization steps, especially in high gain, multi-element arrays. (Author)

AD-403 006 Div. 8
(TISTE/OHD) OTS price $21.00

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES.
Final rept. Vol. 2, 1 Oct 61-30 Sep 62. 30 Sep 62, 1v. EE556
Contract AF30 602 2573, Proj. 5573, Task 557303
RADC TDR63 1, Vol 2

Unclassified report

Descriptors: *Klystrons, *Electron beams, *Microwave amplifiers, Diodes (Electron tubes), Relativity theory, Velocity, Electrical properties, Electromagnetic pulses, Theory, Mathematical analysis, Analysis.

Contents:
(1) A relativistic study of the Llewellyn electronic gap and its applications; (2) The response of klystrons to nanosecond pulses; (3) Nanosecond study; (4) Ballistic analysis of modulated electron beams, and (5) The reduction of spurious output signals in high-power klystrons.

AD-403 025 Div. 8
(TISTE/OHD) OTS price $15.00

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LINEAR-BEAM MICROWAVE TUBES.
Final rept., Vol. 1, 1 Oct 61-30 Sep 62,
by G. Conrad Dalman, Lester F. Eastman, and Paul R. McIsaac. 30 Sep 62, 1v. EE555
Contract AF30 602 2573, Proj. 5573, Task 557303
RADC TDR63 1, vol. 1

Unclassified report

Descriptors: *Electron tubes, *Electron beams, *Linear accelerators, *Klystrons, Cavity resonators, Field theory, Velocity, Filters (Electromagnetic wave), Electromagnetic pulses, Plotters, Theory, Microwave amplifiers, Electron accelerators, Scientific research.

Contents:
Beam circuit interaction studies
Nanosecond pulse study
Velocity filters
Reduction of harmonically related spurious outputs
The current distributions in a velocity-modulated Brillouin-focused electron beam
An investigation of the laminarity of flow in a magnetically confined electron beam
Ion effects in a Brillouin beam
Cavity field plotter
Investigation of the effects of driving the middle cavity of a 3-cavity klystron

AD-403 033 Div. 8
(TISTE/CRJ) OTS price $6.60

Granger Associates, Palo Alto, Calif.
GRANGER ASSOCIATES POINT-TO-POINT LOG PERIODIC ANTENNA SYSTEM.
Final rept.
Jan 63, 58p.
Contract ARDS583
Proj. 113 23 1D

Unclassified report

Descriptors: *Antennas, *Communication equipment, Antenna radiation patterns, Electrical impedance, Attenuation, Coaxial cables, Electrical properties, Measurement, Radio equipment, Effectiveness, High frequency.

The electrical characteristics of log periodic high frequency antennas installed for the Federal Aviation Agency Research and Development Service at Barnegat, New Jersey, and San Juan, Puerto Rico, sites are described. The antenna at Barnegat is a horizontally polarized receiving antenna modified to meet special requirements of the FAA. The antenna at San Juan is a standard vertically polarized Model 726-2.5/30-T transmitting antenna. The results of model radiation

pattern measurements, impedance measurements, ground reflection calculations, and cable attenuation calculations are given for the Barnegat antenna. The general radiation pattern, results of impedance measurements, and cable attenuation calculations are given for the San Juan antenna. Calculated values of installed gain are derived for each antenna. (Author)

AD-403 053 Div. 8, 7
(TISTE/AW) OTS price $10.10

National Cash Register Co., Dayton, Ohio.
FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
Rept. for 1 Feb 62-Jan 63,
by R. R. Chamberlin, J. S. Skarman, D. E. Koopman, and L. E. Blakely, Jr. Mar 63, 111p.
Contract AF 33 657 7919, Proj. 8173, Task 817301
ASD TDR63 223, vol. 1
Unclassified report

Descriptors: *Photoelectric cells (Semiconductor), *Semiconductor films, *Solar cells, Cadmium compounds, Sulfides, Selenides, Copper compounds, Solar radiation, Sprays, Thin films (Storage devices), Vapor plating, Feasibility studies.

The objectives were (1) to demonstrate the feasibility of fabricating a thin film photovoltaic converter using a chemical spray process for the deposition of the active elements and (2) to fabricate for delivery six experimental cells, four using CdS and two using CdSe as the n-type semiconducting layer. Research has shown the feasibility of fabricating photovoltaic converters using thin films of cadmium and copper sulfide (.6 micron and .05 micron respectively) and has shown that the deposition process used is applicable to large area, multiple layer (CdS-CdSe-Cu2S) configurations, solid solution (Cd(S,Se)-Cu2S) cells, and continuous line production. This research has also shown that a heterogeneous junction photovoltaic converter can be formed using CdS and Cu2S. Six (4 CdS and 2 CdSe) cells of 16 sq in area were fabricated for delivery. The four CdS cells had an average efficiency of .2% and the two CdSe cells had an average efficiency of less than .01%. The efficiencies of the four inch square cells do not indicate the potential of the chemical spray process since CdS cells of one square inch were made with 1.2% efficiency and CdS cells of one square centimeter were made with 3.5% efficiency. All of these cells were of the back wall (incident irradiation travels through the substrate) configuration using one eighth inch hard glass as the substrate. (Author)

AD-403 111 Div. 8
(TISTE/PAR) OTS price $3.60

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A MILLIMETER LOW-NOISE TRAVELING-WAVE AMPLIFIER.
Quarterly rept. no. 7, 1 June-31 Dec 62,
by E. W. Kinaman. 25 Jan 63, 26p.
Contract DA36 039sc87384, Proj. 3G19 03 001 04
Unclassified report

Descriptors: *Traveling wave tubes, *Microwave amplifiers, Waveguides, Waveguide couplers, Waveguide windows, Extremely high frequency, Standing wave ratios, Waveguide slots, Helixes, Microwaves.

The current project status, as well as the development work occurring during the reporting period are detailed. The improvement in circuit and waveguide components toward reduced loss in preparation for tube No. 5 are described. This tube, assembled with a helix of .32 db/lambda g loss, provided the first observed over-all gain of 5 db at 80 gc. Circuit deterioration, from abnormal beam interception, prevented noise figure measurements. (Author)

AD-403 117 Div. 8, 20
(TISTE/OHD) OTS price $9.60

Radiation Effects Information Center, Columbus, Ohio.
TRANSIENT RADIATION EFFECTS ON ELECTRONIC COMPONENTS AND SEMICONDUCTOR DEVICES,
by D. C. Jones, F. J. Reid, W. E. Chapin, D. J. Hamman, and E. N. Wyler. 19 Apr 63, 106p. 26
Contract AF33 657 10085, Projs. 7381 and 7634
Task 738103
Unclassified report

Descriptors: *Radiation damage, *Semiconductor devices, *Electronic equipment, Gamma rays, Ionization, Electric currents, Coaxial cables, Electron tubes, Transients, Thyratrons, Resistors, Capacitors, Quartz resonators, Magnets, Test methods, Experimental data, Electronic equipment.

This report summarizes the information that was available before 1962 concerning the effects of nuclear-weapon-burst and simulated-burst radiation on electronic components and semiconductor devices. This work reports only the effects observed in components that are due to gamma rays and/or neutrons of a transient radiation environment. (Author)

AD-403 120 Div. 8
(TISTE/CRJ) OTS price $5.60

ARINC Research Corp., Washington, D. C.
SEMICONDUCTOR RELIABILITY.
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by George J. Blakemore. 30 Apr 63, 48p.
P239 01 3 359
Contract NObsr87664
Unclassified report

Descriptors: *Transistors, *Reliability (Electronics), Life expectancy, Electrical properties, Silicon, Germanium, Operation, Storage, Quality control.

Efforts were made to determine quality assurance requirements for specific semiconductor devices, and to determine confidence limits for the shape parameter beta of the Weibull distribution. Reliability and life test data were obtained from manufacturers of semiconductor devices and equipment and from field use. This data is analyzed and integrated to provide: (a) information on failure rates from life tests and field operation, (b) application data based on the variability of important electrical characteristics under life test conditions, and (c) information on decreasing failure rates and on responses of different junction types to application of various stresses. (Author)

AD-403 125 Div. 8
(TISTE/CRJ) OTS price $8.60

Delco Radio Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRO-

DUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N1358A TRANSISTOR.
Quarterly progress rept. no. 3, 30 Oct 62-30 Jan 63,
by J. C. Kuhns. 30 Jan 63, 1v.
Contract DA36 039sc86725
Unclassified report

Descriptors: *Transistors, *Reliability (Electronics), *Manufacturing methods, Production, Germanium, Growth, Etched crystals, Furnances, Temperature, Life expectancy, Soldering, Surface properties.

Efforts were continued to improve the reliability of the 2N135A transistor by specific improvements of manufacturing techniques. The Milestone II test completed 1,000 hours on test and the results are tabulated and included. Also, additional manufacturing test results and special step-stress results are reported. The failure analysis program has continued to yield information as to the nature of failures and provides a quantitative measurement of the various failure modes. In the analytical-empirical surface study program additional experiments and results are providing insight into the influences of various processes. One of the substitute programs is predicated on these results. (Author)

AD-403 136 Div. 8
(TISTP/MC) OTS price $4.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
DYNAMIC NON-LINEAR ELECTROMAGNETIC WAVE PROPAGATION AND HARMONIC RADIATION IN MAGNETO-IONIC MEDIA,
by O. E. H. Rydbeck. 1 June 63, 38p. SR186
Contract AF19 604 4563, Proj. 8605, Task 860502
AFCRL 63 446
Unclassified report

Report on Ionospheric Research.

Descriptors: *Electromagnetic waves, *Ionospheric propagation, Polarization, Propagation Wave transmission.

This report extends the author's non-linear propagation studies to a magneto-ionic medium. The limitation is that all wave normals have been assumed to be parallel. It is shown that, as expected, travelling wave resonances occur in the magneto-ionic medium, not only between waves of the same kind (e.g., between waves of ordinary polarization) but equally frequently between waves of opposite kinds. From the non-linear interaction point of view there, thus, is not much difference, at least in principle, between the ordinary and extraordinary waves. One also finds, which is of interest in this connection, that the second order non-linear waves are characterized by two different kinds of polarization which become equal only at travelling wave resonance. (Author)

AD-403 139 Div. 8
(TISTE/OHD) OTS price $10.10

Microwave Associates, Inc., Burlington, Mass.
LOW NOISE MILLIMETER DETECTOR.
Final rept.
by Clyde H. Brunquell. 7 Jan 63, 112p.
Contract AF30 602 2651, Proj. 5578, Task 557801
RADC TDR63 44
Unclassified report

Descriptors: *Diodes (Semiconductor), Millimeter waves, Extremely high frequency, Waveguides, Tuning devices, Bandwidth, Sensitivity, Design, Harmonic oscillators, Attenuators, Detectors.

Work conducted on the design and development of 2-millimeter wavelength circular guide point contact detectors is summarized in this report. Circular waveguide formed the basis of the 2-millimeter detector design after preliminary comparison with existing rectangular waveguide detectors at 4-millimeter wavelengths. A waveguide diameter of 0.090 in., with a dumb bell type of adjustable shorting plunger was found to give the best performance. Test results of tangential signal, figure of merit and conversion loss is reported. Results indicate that a 2-mm video detector can be fabricated with a -35 dbm tangential signal sensitivity at 10 uA bias and 1 mc video band width. Calculations of the minimum detectable signal, MDS, from figure of merit measurements indicate the goal of a minimum detectable signal of 10 to the -10th power watts was met. A harmonic generator and a calibrated 2-mm attenuator were constructed. The report contains design data for these components, and the results obtained from their use. (Author)

AD-403 279 Div. 8, 17, 26
(TISTM/PCR) OTS price $6.60

Linde Co., Div. of Union Carbide Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT WORK ON ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY CAPACITORS OF WET AND SOLID TYPES.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63,
by F. E. Cariou. Apr 63, 55p.
Contract NObsr87478
Unclassified report

Descriptors: *Electrolytic capacitors, *Niobium alloys, Sintering, Impurities, Powder metallurgy, Tantalum alloys, Porosity, Oxides, Manufacturing methods, Tables, Niobium.

Contents:
Trace impurity analysis of niobium materials made by three different processes
Preparation of niobium-tantalum alloys
Optimum conditions for removal of carbon from niobium
Optimum anodization conditions for niobium anodes
Optimum processing conditions for solid niobium plug capacitors
Optimum fill electrolyte for wet plug capacitors

AD-403 291 Div. 8, 26
(TISTM/PCR) OTS price $2.60

Radio Corp. of America, Somerville, N. J.
GALLIUM ARSENIDE VARACTOR DIODES.
Quarterly rept. no. 3, 28 Dec 62-28 Mar 63,
by H. Kressel and G. A. Kupsky. 30 Apr 63, 20p.
Contract NObsr87405, Proj. SR008031, Task 9349
Unclassified report

Descriptors: *Diodes (Semiconductor), Arsenides, Specifications, Manufacturing methods, Heat treatment, Crystal structure, Resistance (Electrical), Epitaxial growth, Capacitance, Electric potential, Diffusion, Zinc, Gallium compounds.

Emphasis was placed on the fabrication of diodes with breakdown voltages in excess of 20 volts. Devices were made using both epitaxial and melt-grown material. The change in material characteristics which occur during diffusion were investigated. (Author)

AD-403 324 Div. 8, 26
(TISTE/JWS) OTS price $3.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 3, 14 Nov 62-14 Feb 63.
14 Feb 63, 28p.
Contract DA36 039sc86731
Unclassified report

Descriptors: *Cathode ray tubes, Ceramic materials, Electrodes, Vapor plating, Vacuum apparatus, Deflection, Metal coatings, Manufacturing methods.

A redesign of the basic master for the CY1.1-33 degree deflectron has been satisfactorily completed. Ceramic substrate cones for the model Deflectron were put in process. A study for determining a technique for fastening electrode pins in the ceramic cones was initiated and completed. The adaptation of the vacuum-metallizing technique for manufacturing Deflectron units continues. (Author)

AD-403 362 Div. 8, 30
(TISTE/JWS) OTS price $1.75

Ford Instrument Co., Long Island City, N. Y.
EMITTER MATERIALS STUDY THERMIONIC ENERGY CONVERTERS.
Final technical rept.
31 Dec 62, 1v.
Contract Nonr369600, Proj. NR391 429
Unclassified report

Descriptors: *Thermionic converters, *Electrodes, Oxides, Radiation damage, Structural properties, Fast neutrons, Cesium, Calcium compounds, Strontium compounds, Barium compounds.

An experimental program was conducted on selected emitter materials to determine their potential for use in low-temperature thermionic energy converters. One oxide emitter and four different dispenser types were evaluated in parallel plate and cylindrical geometry in both glass and metal ceramic construction. With respect to power density the various dispenser emitter types showed suitable and reasonably similar performance. Performance degradation was reversed in some of these diodes and its mechanism explored and explained. (Author)

AD-403 366 Div. 8, 26
(TISTE/JWS) OTS price $4.60

Lansdale Div., Philico Corp., Pa.
PEM FOR TRANSISTOR MANUFACTURING PROCESS IMPROVEMENT.
Quarterly progress rept. no. 3, 1 Nov 62-31 Jan 63,
by J. Sanders. 31 Jan 63, 1v.
Contract DA36 039sc86720
Unclassified report

Descriptors: *Manufacturing methods, *Transistors, Electrodes, Silver, Germanium compounds, Encapsulation, Gold, Paints, Temperature, Test methods, Test equipment (Electronics), Metal coatings, Production.

The final design of the pilot line jet etch transistor type 2N501A is reported complete. An evaluation of emitter and collector lead wires has been completed and an evaluation of metagermanic surface treatment has been completed. No benefit to diode stability was demonstrated; in fact, it was determined that metagermanic acid is detrimental to yield for this type of device. The hot sealing oven has been installed and is operating satisfactorily. Black painting as a final finish has been shown to improve the operating capability of the pilot line device and has been specified for this transistor. Modifications of the encapsulant dispensing equipment have been completed. Evaluation of the thermal resistance measurements by the continuous d-c VEB method has shown that a value in close agreement with the effective thermal resistance of the transistor can be obtained. Verification of the slope of the failure rate curve, as proposed in the Second Quarterly Report, has been obtained. This verification was obtained on production run transistors equivalent to the type being manufactured in conjuction with this program. (Author)

AD-403 375 Div. 8, 30
(TISTE/JWS) OTS price $2.60

Bell Helicopter Co., Fort Worth, Tex.
THE DERIVATION OF A COUPLING NETWORK FOR THE DYNAMIC SIMULATOR PLATFORM,
by N. E. Welter. 8 Aug 59, 18p. D228 430 007.
Contract Nonr1670 00
Unclassified report

Descriptors: *Test equipment, *Helicopters, *Servomechanisms, *Flight simulators, Filters (Electromagnetic wave), Mathematical prediction, Frequency, Control simulators, Control systems, Noise (Radio), Errors, Calculus of variations.

An interim solution to the problem of scaling dynamic simulator platform motions is presented which derives the filter network between the airframe computer and the platform servo system to give minimum acceleration error subject to the constraint that the platform motion is confined to limited values. The constants of this optimal coupling filter are given as a function of the expected rms velocity for the various degrees of freedom of the system. (Author)

AD-403 390 Div. 8
(TISTE/CAM) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE INTERCHANGE OF SOURCE AND DETECTOR IN MICROWAVE MEASUREMENTS,
by H. M. Altschuler. 11 Apr 63, 17p. 1149 63
Grant AFOSR62 295
Unclassified report

Descriptors: *Generators, *Detectors, *Electrical impedance, Microwave frequency, Analysis, Microwave bridges, Impedance bridges, Scattering, Theory, Measurement.

The technique for interchanging generator and detector in the impedance measurement of microwave one-ports is a useful, known procedure often applied when low powers are indicated. The necessary and sufficient conditions for the validity of such measurements are critically examined and direct extensions of this technique to similar measurements of reciprocal two-ports are given. A completely separate analysis is necessary when such an interchange is made in the case of an interference bridge to be used for the determination of the scattering parameters of general

(active or passive and reciprocal or nonreciprocal) two-ports. This analysis is presented in detail. It results in a new low-power-level version of a method of measuring general two-ports given in an earlier paper. The measurement technique and the subsequent data analysis of the two versions are found to be identical, except that the two scattering parameters S12 and S21 appear in interchanged positions. (Author)

AD-403 403 Div. 8
(TISTP/MH) OTS price $5.60

Syracuse U. Research Inst., N. Y.
SENSITIVITY CONSIDERATIONS IN ACTIVE NETWORK SYNTHESIS,
by Norman Balabanian. 1 Apr 63, 45p. SR1; EE975 6304SR1
Contract AF19 628 1649, Proj. 5628
AFCRL63 91 Unclassified report

Descriptors: *Electrical networks, Admittance, Impedance matching, Amplifiers, Functions, Sensitivity, Transistors, Transistor amplifiers, Synthesis.

This report is concerned with the problem of realization of active RC networks, utilizing practical transistor amplifiers, with minimum sensitivity of the transfer function or poles to variations in transistor parameters, in particular to the most variable of the parameters. Two synthesis techniques are considered and realizability conditions are given for single-stage and two-stage realizations. It is shown that the sensitivity of the poles to the variation of transistor alpha can be made as small as desired. (Author)

AD-403 442 Div. 8, 12, 30
(TISTE/OHD) OTS price $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
ROCKET INSTRUMENTATION FOR THE MEASUREMENT OF AC CONDUCTIVITY, WITH A CAPACITIVE PROBE, AND LONG WAVE PROPAGATION IN THE LOWER IONOSPHERE,
by T. A. Seliga and R. W. Vogt. 1962, 58p.
SR (E)181
Contract AF19 604 8012, Proj. 7663, Task 766301
AFCRL63 447 Unclassified report

Descriptors: *Instrumentation, *Ionospheric propagation, *Electrical conductance, Atmospheric sounding, Low frequency, Circuits, Sounding rockets, Measuring devices (Electrical and electronic), Medium frequency.

This report summarizes the mechanical and electrical characteristics of instrumentation designed to be flown in a Black Brant rocket along with another payload developed by AFCRL. The experiments for which the instrumentation is used are: (a) an A-C conductivity probe which measures the impedance between an insulated section of the nose cone and the body of the rocket at two different frequencies; and (b) a propagation experiment which measures the field strength, along two axes of the rocket, of a low frequency wave transmitted from the ground to the rocket. A block diagram of the system used to perform the experiments is given. (Author)

AD-403 444 Div. 8
(TISTE/OHD) OTS price $1.80

General Electric Co., Philadelphia, Pa.
PROGRAM 206. RELIABILITY PROGRAM STATUS AND DATA REPORT. VOLUME 2.
7 May 63, 187p. DIN63SD4683A, vol. 2
Contract AF04 69576
Unclassified report

Descriptors: *Malfunctions, *Reliability (Electronics), Circuits, Experimental data, Tables, Electronic equipment, Reports.

This report is presented in two volumes. Volume 1 is comprised of six sections. Volume 2 consists of the new failure summary log and the failure analysis review board (FARB) minutes. (Author)

AD-403 454 Div. 8
(TISTE/OHD) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
DISTRIBUTED JUNCTION TUNNEL DIODE OSCILLATOR. PHASE II.
Quarterly progress rept. no. 3, 1 Nov 62-1 Feb 63,
by C. Howell. 1 Feb 63, 14p.
Contract DA36 038sc89163, Proj. 3A99 21 001
Unclassified report

Descriptors: *Tunnel diodes, *Microwave oscillators, Manufacturing methods, Capacitance, Transmission lines.

Efforts to determine the feasibility of constructing 10 mw 10 kmc tunnel diode oscillators have continued and diode requirements for these oscillators determined. Various diode fabrication techniques and oscillator circuit techniques were investigated to determine the best combinations of these to potentially meet the frequency and power requirements. Four packaged and two distributed junction tunnel diode oscillators were designed and built. The present oscillator study has concentrated on the packaged X-band oscillators. Using the packaged single diode oscillators, power outputs of more than 100 microwatts have been obtained in X-band. Tuning problems seriously hamper the use of larger peak current, larger capacity packaged diodes. Some circuit changes have been made which partially alleviate this problem. The use of a resistive shunt across the ceramic of the diode package has improved the high-frequency or power output characteristics of these oscillators. The reduced-size stripline package oscillator is the most successful. Low peak current to capacitance ratios have been a difficulty for the distributed tunnel diode; so far no power output has been obtained in X-band from a distributed tunnel diode oscillator. (Author)

AD-403 455 Div. 8
(TISTE/OHD) OTS price $9.60

TYCO Inc., Waltham, Mass.
HIGH Q VARACTOR DIODES.
Final technical summary rept.,
by Martin Weinstein, A. I. Mlavsky and R. O. Bell.
30 Apr 63, 109p.
Contract NObsr87340, Proj. SR0080301, Task 9346
Unclassified report

Descriptors: *Diodes (Semiconductor), *Semiconductor devices, Gallium compounds, Arsenides, Extremely high frequency, Electron transitions, Manufacturing methods, Phosphides, Electric potential, Capacitance, Hydrochloric acid, Design, Germanium, Variable capacitors.

Low pump power varactor diodes have been fabricated using epitaxial GaAs. Frequency cut-offs as high as 785 kmc have been obtained at breakdown. A detailed analysis of the parameters influencing point-contact GaAs varactors is given. The results of a basic program to determine the feasibility of employing high energy gap semiconductors in varactor diodes are presented. The voltage breakdown and capacitance of abrupt

large area P++ on N GaAs diodes have been determined as a function of resistivity. Square law behavior is observed up to breakdown. The electrical properties of P++ on N large area GaP diodes are also given. The HCl carrier gas technique and the travelling solvent method of crystal growth have been employed in the epitaxial growth of GaAs and GaP on GaAs, GaP, and Ge substrates. The properties of GaAs-GaP, GaP-Ge, and GaAs-Ge heterojunctions are presented. Low pump power varactor diodes have been fabricated using epitaxial GaP as the active semiconductor (GaP deposited on 0.0007 ohm-cm GaAs). Frequency cut-offs of 187 kmc at-2v have been obtained using this N on N++ configuration. (Author)

AD-403 458 Div. 8
(TISTE/OHD) OTS price $5.60

Microwave Associates, Inc., Burlington, Mass.
NANOSECOND PULSE BREAKDOWN STUDY.
Final rept.,
by C. Buntschuh, B. Salkins, and M. Gilden.
21 Feb 63, 1v.
Contract AF30 602 2782
RADC TDR63 82

Unclassified report

Descriptors: *Radiofrequency pulses, *Electric discharges, Radiofrequency power, Waveguide switches, Waveguides, Gas ionization, Theory Air, Electric potential, Dielectrics, Halogenated hydrocarbons, Fluorides, Pulse generators, Cavity resonators, Radar pulses.

An estimate is made of the pulse breakdown characteristic for air on the basis of the theory worked out by Gould and Roberts and the available data. The theory is critically examined and the consequences of the assumptions made are investigated to insure its applicability to extremely short pulse breakdown. Several possible modifications are advanced which require experimental verification with nanosecond pulse lengths. The possible advantages of using so-called high dielectric strength gas is also discussed. Progress on development of a nanosecond pulse generation circuit is reported; several ATR switches are described and discussed. (Author)

AD-403 466 Div. 8
(TISTP/FEM) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
A FEW PROBABILISTIC PROPERTIES OF MODULAR CIRCUITS,
by H. Kaneko. 30 Apr 62, 30p. SR13; S60, I448
Contract AF19 604 5466, Proj. 5632, Task 56320
AFCRL 62 939

Unclassified report

Descriptors: *Statistical processes, *Communication systems, Combinatorial analysis, Transformations (Mathematics), Matrix algebra, Delay lines, Errors, Corrections, Dynamic programming, Communication theory, Probability, Circuits.

Output probabilities of finite-state-machine elements are studied when the input of the machine elements is a random process. Delay element, modulo m adder and modulo m multiplier are considered as the machine elements. A new approach to the problem is made by defining the transformation matrices $\underline{T}$ and $\underline{U}_a$ for a modulo m adder and a modulo m multiplier respectively. By using these matrices, the output probabilities of the machine and the stochastic matrix of the output are given in explicit expressions, assuming that the input process is a finite-state, time-invariant Markov process. A few examples of the combinatorial circuit of these elements are also studied. (Author)

AD-403 470 Div. 8, 15
(TISTE/CAM) OTS price $6.60

Tennessee U. Engineering Experiment Station Knoxville.
FIRST-ORDER IMPEDANCES OF A CIRCULAR ANTENNA ARRAY,
by C. E. Hickman. 1 Mar 63, 57p. SR5
Contract AF19 628 288, Proj. 4600, Task 460002
AFCRL 63 77

Unclassified report

Descriptors: *Dipole antennas, *Electrical impedance, Antenna configurations, Coupled antennas, Electric currents, Electric potential, Linear systems, Mathematical analysis, Theory, Tables, Integral equations.

The integral equation solution is presented for a circular antenna array and presents a limited set of data for first order impedances. The array consists of identical, parallel dipoles which are equally spaced around the circumference of a circle. The more accurate first order impedances calculated are an addition to the numerical data available for this type of antenna array. (Author)

AD-403 475 Div. 8
(TISTE/JWS) OTS price $5.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
SOLID-STATE CIRCUITS.
Quarterly progress rept. no. 3,
by S. Hamilton, W. W. Heinz, S. Okwit, E. W. Sard, and K. Siegel. Jan 63, 45p. 1654I3
Contract AF30 602 2699, Proj. 4506, Task 450602
RADC TDR63 83

Unclassified report

Descriptors: *Limiters, *Diodes (Semiconductor), Yttrium, Iron alloys, Garnet, Ferrites, Single crystals, Attenuation, Tuned circuits, Waveguide circulators, C band, Ultrahigh frequency, Mathematical analysis.

Measurements of linewidth and anisotropy were made on a 600 4PiMs Ga-YIG single-crystal ferrite. The linewidth behaved normally with respect to its variation with crystal axis orientation; that is, the linewidths were maximum (7.8 oersteds) with the external fields along the easy axis and minimum (3.7 oersteds) along the hard axis. A low-threshold varactor limiter was designed and constructed using a varactor-loaded single-tuned circuit. By using the field build-up characteristic of a highly regenerative circuit, threshold-limiting levels of less than -20 dbm were achieved. Investigation of the performance of commercially available three-port C-band circulators, relative to the theoretical performance expected from Bosma's analysis, was continued. Modifications of Bosma's equations were made to allow for negative mu eff values and extended frequency variation. The effect of imperfectly matching a circulator, by the technique derived earlier in the project, was analyzed.

Division 9 - FLUID MECHANICS

An analysis of the input circuit of a one-port parametric amplifier (using a simplified series-equivalent circuit) was performed, from which phase shift versus frequency as a function of gain was obtained. (Author)

AD-403 476 Div. 8, 26
(TISTE/CRJ) OTS price $8.10

Westinghouse Electric Corp., Baltimore, Md.
STUDY OF FABRICATION OF MICROELECTRIC ASSEMBLIES FOR FREQUENCY AND TIME CONTROL SYSTEMS.
Interim development rept. no. 3, 1 Jan - 29 Mar 63.
22 Apr 63, 78p.
Contract NObsr87593, Proj. SR0080303, Task 9624
Unclassified report

Descriptors: *Microminiaturization (Electronics), *Packaged circuits, Manufacturing methods, Frequency, Control, Digital systems, Analog systems, Crystal filters, Circuits, Transistor amplifiers, Feedback, Electric potential, Limiters, Tuned circuits, Gates (Circuits), Impedance matching, Power, Electric currents, Frequency multipliers, Cathode followers, Crystal mixers.

Efforts were continued on the design of a family of microelectronic blocks for time and frequency control equipment. A listing of the load requirements for each circuit was assembled. The various microelectronic fabrication techniques of packaging were evaluated. A flat package of the order of 1/2 x 1/2 x 1/10 in. is recommended to package each circuit. The packages should be interconnected on three sides by printed circuit boards and assembled into a module. The Amp Meca interconnection method is recommended. Designs were completed, temperature tests were made, and specifications were written for the following circuits: decade divider (includes flip-flop and gate), digital gate, universal amplifier, analog gate, and squaring circuit. The microminiature crystal filter evaluation is substantially complete. Current results show crystal filter performance to be superior to other approaches though filter size is larger than is desired. Special purpose circuit designs are under evaluation. (Author)

AD-403 478 Div. 8, 2
(TISTP/WH) OTS price $1.60

Space Sciences Lab., U. of Calif., Berkeley.
8.35 MM RADIO EMISSION FROM JUPITER AND VENUS, by D. D. Thornton and W. J. Welch. 16 Apr 63, 12p. Series 4, Issue 25
Contract Nonr22254 and Grant NSF G16741
Unclassified report

Descriptors: *Millimeter waves, *Extra-terrestrial radio waves, *Jupiter, *Venus, Radiometers, Planetary atmospheres, Planets.

Observations of the 8.35 mm radio emission from Jupiter and Venus are reported. A disc temperature of 144 ± 23 deg. is found for Jupiter and a temperature of 383 ± 60 deg. is found for Venus. It is shown that the 8 mm brightness temperature of Jupiter should correspond closely to the temperature at the level of the visible cloud cover. (Author)

AD-403 482 Div. 8
(TISTE/JBM) OTS price $1.60

Radio Corp. of America, Somerville, N. J.
RESEARCH AND DEVELOPMENT ON HIGH CURRENT TUNNEL DIODES.
Interim development rept. 1 Jan 63-31 Mar 63. 31 Mar 63, 13p.
Contract Nobsr87540, Proj. SR0080301
Unclassified report

Descriptors: *Tunnel diodes, Crystal growth, Configuration, Electric currents, Germanium, Effectiveness, Arsenides, Gallium compounds, Packaged circuits, Temperature, Density, Resistance (Electrical), Manufacturing methods.

Efforts were continued on the development of techniques for fabricating high-current tunnel diodes. GaAs tunnel diodes with peak currents of up to 860 amp and efficiencies greater than 60% were fabricated. Process improvements reduced pellet cracking and allow current densities as low as 100 amp to be used while still maintaining good I sub P/I sub V ratios. These improvements will greatly reduce contacting problems. The counterdopant dot alloying process was found to provide very thin effective base wafer thicknesses, further reducing contacting problems, and allowing relatively thick wafers to be used. The dependence of the I sub P/I sub V ratio on current density is more pronounced for Ge than for GaAs. Current densities of about 3,000 amp/sq cm are required for Ge, if an I sub P/I sub V ratio of 10/1 is to be obtained. This high-current density places restrictions on the contact and base wafer thickness. Packages for 100-amp and 300-amp tunnel diodes were fabricated. The theoretical limit of efficiency for GaAs tunnel diodes is about 70%, while the practical limit for Ge tunnel diodes is about 60%. (Author)

9. FLUID MECHANICS

AD-402 581 Div. 9
(TISTP/MC) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR (SELECTED ARTICLES).
28 Mar 63, 38p.
FTD TT63 222
Unclassified report

Trans. from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No. 3, pp. 40-54, 55-57, 1961.

Descriptors: *Jets, *Gas flow, Fluid mechanics, Turbulence, Fluid flow, Partial differential equations, Jet mixing flow, Enthalpy, Thermodynamics.

AD-402 582 Div. 9
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING FINNED DIFFUSORS, by V. K. Migay. 3 Apr 63, 10p.
FTD TT63 86 Unclassified report

Trans. from Teploenergetika, no. 10, pp. 55-59, Oct 62.

Descriptors: *Diffusers, Reynolds number, Pressure, Nozzles, Fins.

AD-402 588 Div. 9
(TISTP/MC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATING THERMAL BOUNDARY LAYER IN A FLOW OF COMPRESSIBLE GAS,
by L. M. Zysina-Molozhen. 3 Apr 63, 8p.
FTD TT63 84
Unclassified report

Trans. from Inzhenerno-Fizicheskiy Zhurnal, No. 6, pp. 21-26, 1962.

Descriptors: *Gas flow, Boundary layer transition, Compressible flow, Fluid dynamic properties, Laminar boundary layer, Turbulent boundary layer.

AD-402 596 Div. 9
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR. DEPARTMENT OF TECHNICAL SCIENCES. MECHANICS AND MACHINERY MANUFACTURE (SELECTED ARTICLES).
5 Apr 63, 21p.
FTD TT63 91
Unclassified report

Trans. from Izvestiya, Akademiya Nauk SSSR. Otdeleniye Tekhnicheskikh Nauk. Mekhanika I Mashinostroyeniye. No. 5, pp. 11-15, 30-37, 1961.

Descriptors: *Heat transfer, *Supersonic flow, Fluid flow, Pressure, Temperature, Joule-Thompson effect.

Contents:
Effect of Joule heating on heat transmission at the critical point
Determining the base pressure and base temperature on the sudden expansion of a sonic or supersonic flow

AD-402 598 Div. 9
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
JOURNAL OF ENGINEERING PHYSICS (SELECTED ARTICLES).
5 Apr 63, 16p.
FTD TT63 85
Unclassified report

Trans. from Inzhenerno-Fizicheskiy Zhurnal, Vol. 5, Nr. 9, Sept. 1962, pp. 25-32, 81-84.

Descriptors: *Gases, *Laval nozzles, High temperature research, Mathematical analysis, Thermodynamics, Liquids.

Contents:
Calculating Thermodynamic Properties of Real Gases at High Temperatures
Leakage of Gas into a Liquid through the Laval Nozzle

AD-402 698 Div. 9, 30
(TISTP/JW) OTS price $7.60

Southwest Research Inst., San Antonio, Texas.
FURTHER DEVELOPMENT OF A MORE ACCURATE METHOD FOR CALCULATING BODY-WATER IMPACT PRESSURES,
by Wen-Hwa Chu and David R. Falconer. Jan 63, 1v.
Technical rept. no. 5
Contract Nonr2729 00 SwRI Project no. 23 834 2
Unclassified report

Descriptors: *Water entry, *Computers, Programming (Computers), Relaxation time, Fluid mechanics, Landing impact, Differential equations.

A computer program for two-dimensional slamming of a Mariner section is discussed. The program was devised to examine the practical applicability of a previously described numerical method and to gain insight for future development of a numerical scheme should additional effort appear valuable. A discussion of this effort and the implications for the future are given. (Author)

AD-402 768 Div. 9
(TISTA/GEC) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
DETERMINATION OF THE STREAMLINES ON A SPHERE-CONE AT ANGLE OF ATTACK FROM THE MEASURED SURFACE PRESSURE DISTRIBUTION,
by E. L. Harris. Mar 63, 1v. TR63 31
Unclassified report

Descriptors: *Hemispherical shells, *Conical bodies, Supersonic flow, Load distribution, Pressure, Fluid flow, Equations, Programming (Computers), Aerodynamic characteristics, Turbulent flow.

A method is given for computing the inviscid fluid streamlines on a sphere-cone at an angle of attack in supersonic flow from the measured surface pressure distribution. The boundary layer was assumed to be negligibly thin. The necessary equations are derived and put in a form suitable for programming on a digital computer. (Author)

AD-402 935 Div. 9
(TISTP/FEM) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AN ANALYSIS OF INITIAL STATIC PRESSURE PROBE MEASUREMENTS IN A LOW-DENSITY HYPERVELOCITY WIND TUNNEL,
by David E. Boylan. Apr 63, 16p. TDR63 94
Contract AF40 600 1000
Unclassified report

Descriptors: *Gas flow, Wind tunnels, Wind tunnel nozzles, Boundary layer, Temperature, Measurement, Pressure.

An initial experimental program was previously conducted to study the problems in using static-pressure probes for flow calibration purposes in low-density, hypervelocity wind tunnels with continuous flow. This data is reviewed in the light of more recent data on thermal transpiration. Results indicate that such probes may be used for what might be termed secondary calibrations, but care is required in interpreting the results. The present experiment yielded data which are compared to static pressures calculated from impact-pressure probe calibrations. (Author)

AD-402 998 Div. 9
(TISTP/MC) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
AEROMECHANICS PROGRAM HEAT TRANSFER AND FLUID MECHANICS.
Semiannual technical rept., 1 July-31 Dec 62, by P. M. Chung, W. S. Lewellen, and D. J. Spencer. 28 Feb 63, 31p. TDR169 3230 12, TR2
Contract AF04 695 169
SSD TDR63 44
Unclassified report

Division 9 - FLUID MECHANICS

Descriptors: *Heat transfer, *Fluid mechanics, Boundary layer, Fluid flow, Vortices, Shock tubes, Secondary injection, Thrust vector control systems, Hypersonic characteristics.

This report covers the major areas of: Heat Transfer, Fluid Mechanics, and Arc Tunnel Facilities. Studies of the effect of various distributions of surface catalycity on heat transfer for frozen boundary layer flows of dissociated gas around hypersonic bodies are summarized. The fluid dynamics investigations include summaries of studies of expansion of gas clouds, three-dimensional boundary layers, electrical interactions of weakly ionized gas with solid boundaries, vortex flows, test time in shock tubes, and secondary injection for thrust vector control. Arc tunnel facility improvements include completion of the high capacity pumping system, implementation of the constant power control system, and design of an improved tests section and model/probe support mechanism. (Author)

AD-403 004 Div. 9
(TISTP/FEM) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
AN ANALYSIS OF THE EFFECT OF HETEROGENEOUS REACTION KINETICS ON THE COMBUSTION OF GRAPHITE AT THE STAGNATION REGION OF A BLUNT BODY IN HYPERSONIC FLOW,
by W. E. Welsh, Jr. and P. M. Chung. 28 Feb 63, 29p. TDR169 3230 12TN 6
Contract AF04 695 169
SSD TDR63 40
Unclassified report

Descriptors: *Reentry vehicles, *Graphited materials, *Hypersonic flow, Reaction kinetics, Surface properties, Surface temperature, Oxygen, Carbon, Carbon compounds, Boundary layer, Partial differential equations, Transformations (Mathematics), Heat transfer, Heat shields, Combustion, Blunt bodies.

An approximate analysis is performed for the combustion rate of carbon in air at the stagnation region of a blunt body in hypersonic flow for the intermediate regime of conditions between the reaction-kinetic-limited and the diffusion-limited extremes. The effect of mass addition to the boundary layer caused by the combustion is considered. Combustion rates in the intermediate regime are derived using closed-form approximations for available boundary layer analyses. The results, shown in a generalized form, are valid for arbitrary reaction kinetics and combustion products. The limitations of the series-resistance approach are demonstrated. A numerical comparison of the closed-form results for the mass loss rates in the diffusion-limited regime and the recent results of Scala indicate that the present simplifications are satisfactory for engineering purposes. (Author)

AD-403 014 Div. 9, 2, 1
(TISTP/JW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
EXPERIMENTAL INVESTIGATIONS OF THE ENERGY SPECTRUM OF ATMOSPHERIC TURBULENCE.
2 May 63, 14p. T63 55
Unclassified report

Trans. from Shur, G. N. Eksperimental'nyye issledovaniya Energeticheskogo Spektra Atmosfernoy Turbulentnosti. IN: Tsentral'naya Aerologicheskaya Observatoriya. Trudy, no. 43, pp. 79-90, 1962.

Descriptors: *Turbulence, *Energy, Density, Fourier analysis, Kinetic theory, Atmosphere, Spectra (Visible & ultraviolet).

AD-403 016 Div. 9, 25
(TISTP/JW) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
ON SLENDER BODIES OF MINIMUM DRAG IN NEWTONIAN FLOW,
by David G. Hull. Jan 63, 32p. TR67; D1 82 0224
Unclassified report

Also available from the author.

Descriptors: *Fluid flow, Pressure, Drag, Motion, Density, Cylindrical bodies, Bodies of revolution.

In recent papers the problem of minimizing the pressure drag of slender bodies in Newtonian flow was considered in general and, then, solved for those particular cases in which, of the four geometric properties being considered (thickness, length, enclosed area, and moment of inertia of the contour for two-dimensional shapes and diameter, length, wetted area, and volume for axisymmetric shapes), two are prescribed and the remaining two are free. The analysis is here extended to the class of problems in which three quantities are prescribed and the remaining is free. After the variational problem is reformulated in order to account for the fact that the pressure coefficient must be nonnegative everywhere, special attention is devoted to those particular cases in which two of the three prescribed quantities are the thickness and the length. In each case, a one-parameter family of extremal solutions is obtained, the parameter being related to the three prescribed quantities. Furthermore, each family of extremal solutions contains three classes of body shapes: an infinitely thin plate or a spike followed by a regular shape, a regular shape only, and a regular shape followed by a constant thickness contour or a cylinder. In all of the cases considered, analytical expressions are obtained for the geometry of the optimum shapes and the associated drag coefficients.

AD-403 035 Div. 9, 1
(TISTA/GEC) OTS price $12.50

Aerospace Corp., Los Angeles, Calif.
QUASI-STATIC AERO-THERMO-ELASTIC ANALYSIS: ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
by William P. Rodden, Edith F. Farkas and Heather A. Malcom. 1 Mar 63, 166p. TDR169 3230 11TN8
Contract AF04 695 169
SSD TDR63 14
Unclassified report

Descriptors: *Aerothermoelasticity, Programming (Computers), Aeroelasticity, Aerodynamic characteristics, Structures, Load distribution, Stability, Aircraft, Equations, Mathematical analysis, Numerical analysis.

A collocation formulation is used as the basis for a unified approach to the various quasi-static aero-thermo-elastic problems. These problems include rigid and flexible load distributions, divergence, estimation of rigid and

flexible static and dynamic stability derivatives, and the correction of wind tunnel data measured on flexible models. The formulation utilizes structural, thermal, and aerodynamic influence coefficients. The Aerospace IBM 7090 Computer Program No. LD003A provides the solution to the above problems. The program capacity is fifty collocation control points and ten values of dynamic pressure. (Author)

AD-403 049 Div. 9, 1
(TISTP/JW) OTS price $2.00

Aerodynamic Lab., Ohio State U. Research Foundation, Columbus.
THEORY OF THE COMPRESSIBLE LAMINAR BOUNDARY LAYER UNDER ARBITRARY PRESSURE AND TEMPERATURE GRADIENTS,
by Theodore C. Nark. Mar 63, 65p.
Contract AF33 616 7827, Proj. 1366, Task 136606
ASD TDR62 962
Unclassified report

Report on Aerodynamic and Flight Mechanics.

Descriptors: *Laminar boundary layers, Boundary layer, Temperature, Aerodynamic characteristics, Pressure, Hypersonic flow, Integrals, Analysis, Compressible flow.

An analysis is presented which can predict the compressible laminar boundary layer characteristics on a blunt flat plate with prescribed surface temperature and pressure gradients. The analysis use, a Von Karman integral method to solve the compressible momentum and energy equations. Problems usually encountered with very high pressure gradients are avoided by employing a new velocity profile which remains undistorted. A first-order analysis of the effect of entropy gradients in the inviscid flow on the boundary layer parameters is also given. (Author)

AD-403 146 Div. 9, 1
(TISTA/LSK) OTS price $15.00

Vidya Inc., Palo Alto, Calif.
THEORETICAL INVESTIGATION OF DYNAMIC STABILITY DERIVATIVES OF DUCTED PROPELLERS,
by A. R. Kriebel, A. H. Sacks, and J. N. Nielsen. 9 Jan 63, 1v. Vidya rept. 63 95
Contract NOw62 0129, Proj. 167/C
Unclassified report

Descriptors: *Shrouded propellers, Aerodynamic characteristics, Equations, Theory, Experimental data, Stability, Mathematical analysis.

The static and dynamic stability derivatives of a ducted propeller are predicted by theoretical analysis. The ducted propeller is initially represented by a short, straight, thin ring surrounding a uniformly loaded actuator disk. Then the interference effect of the ring duct on an actual propeller with finite number of blades is calculated in order to determine the contribution of the propeller to the stability derivatives of the ducted propeller. The analysis is applied to the case of a torpedo-like configuration consisting of a body of revolution with a rear-mounted ducted propeller in axial flow. The theory for the ducted propeller is compared with available experimental data in hovering, steady axial flow, and steady flow at angle of attack. The division of thrust between duct and propeller is predicted moderately well for ducts of small chord/diameter ratios with no flow separation. A method for reducing ducted propeller data is presented and shown to give better agreement with theory than conventional methods. (Author)

AD-403 347 Div. 9
(TISTP/JW) OTS price $3.60

California Inst. of Tech., Pasadena.
THE COLLAPSE OF A SPHERICAL CAVITY IN A COMPRESSIBLE LIQUID.
by Robert Hickling and Milton S. Plesset.
Mar 63, 33p. 85 24
Contract Nonr220 28
Unclassified report

Descriptors: *Compressible flow, *Cavitation, Elastic shells, Wave transmission, Fluid flow, Bubbles, Pressurized water, Acoustic properties, Explosion bubbles, Shock waves.

Numerical solutions for the flow in the vicinity of a collapsing spherical bubble in water are presented. The bubble is assumed to contain a small amount of gas and the solutions are taken beyond the point where the bubble reaches its minimum radius up to the stage where a pressure wave forms and propagates outwards into the liquid. The motion, up to the point where the minimum radius is attained, is found by solving the equations of motion both in the Lagrangian and in the characteristic forms. These are in good agreement with each other and also with the approximate theory of Gilmore which is demonstrated to be accurate over a wide range of Mach number. The liquid flow after the minimum radius has been attained is determined from a solution of the Lagrangian equations. It is shown that an acoustic approximation is quite valid for fairly high pressures and this fact is used to determine the peak intensity of the pressure wave at a distance from the center of collapse. It is estimated in the case of typical cavitation bubbles that such intensities are sufficient to cause cavitation damage. (Author)

AD-403 351 Div. 9
(TISTA/LSK) OTS price $2.50

Aerodynamic Lab., Ohio State U. Research Foundation, Columbus.
AN EXPERIMENTAL INVESTIGATION OF THE SURFACE PRESSURE AND THE LAMINAR BOUNDARY LAYER ON A BLUNT FLAT PLATE IN HYPERSONIC FLOW. VOLUME II. LAMINAR BOUNDARY LAYER PROFILE ON THE FLAT PLATE.
Final rept. Jan 61-Aug 62.
by G. M. Gregorek, T. C. Nark, and J. D. Lee.
Mar 63, 107p.
Contract AF33 616 7827, Proj. 1366, Task 136606
ASD TDR62 792, vol. 2
Unclassified report

Report on Aerodynamics and Flight Mechanics.

Descriptors: *Flat plate models, Blunt bodies, Laminar boundary layer, Surface properties, Pressure, Compressible flow, Model tests, Wind tunnel models, Hypersonic characteristics.

The laminar boundary layer on unswept, 1/2-inch thick, cylindrically-blunted flat plate was examined at Mach numbers of 7, 10, 12 and 14; at Reynolds numbers from 9000 to 27,300, based on the plate thickness; and at angles-of-attack of 0, 10 (compression) and 15 degrees (expansion). The layer was probed at three stations, S/D = 8, 16 and 22 using a pitot probe and a sonic-pneumatic total temperature probe. The tests were conducted in the 12-inch continuous hypersonic wind tunnel of the Ohio State University Aerodynamic Laboratory. The two probe outputs, together with the static pressure at the wall, were processed through an analogue computer and

the results, i.e., Mach number, velocity, temperature, etc., are tabulated as functions of distance from the surface. Integrations were performed to obtain displacement and momentum thicknesses. Skin friction was also obtained, through the measurement of the velocity gradient at the wall. The results are presented in tabulated form, while typical data are plotted to illustrate the trends established by Mach number, Reynolds number and angle-of-attack. (Author)

AD-403 365 Div. 9, 1
(TISTA/GEC) OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE EFFECTS OF ATMOSPHERIC TURBULENCE UPON FLIGHT AT LOW ALTITUDE AND HIGH SPEED,
by W. O. Breuhaus. 31 Oct 61, 1v. FDM325
Unclassified report

Descriptors: *Jet fighters, *Jet bombers, Low altitude, Turbulence, Naval aircraft, Attack bombers, Aerodynamic characteristics, Gusts, Gust loads, Fatigue (Mechanics), Terrain avoidance, Transonic characteristics.

Contents:
Aircraft performance requirements for low altitude flight
The response of an aircraft to atmospheric turbulence
Probability of encountering turbulence at low altitudes
Variation of turbulence expectancy
Effect of turbulence-induced motions upon the crew
Synthesis of preceding sections
Gust alleviation and load alleviation
Structural fatigue

AD-403 460 Div. 9
(TISTA/LSK) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
SLENDER, TWO DIMENSIONAL BODIES HAVING MINIMUM TOTAL DRAG AT HYPERSONIC SPEEDS,
by Angelo Miele and Robert E. Pritchard. Feb 63, 38p. FSLTR71; D1 82 0232
Unclassified report

Also available from the author.

Descriptors: *Cylindrical bodies, *Conical bodies, Hypersonic characteristics, Theory, Mathematical analysis, Pressure, Friction, Axially symmetric flow, Hypersonic flow, Equations, Drag.

Consideration was given to the problem of minimizing the total drag (sum of the pressure drag and the friction drag) of a slender, two-dimensional, symmetric body at zero angle of attack in hypersonic flow under the assumption that the distribution of pressure coefficients is Newtonian and that the friction coefficient is constant. (Author)

AD-403 486 Div. 9
(TISTA/LSK) OTS price $4.60

Polytechnic Inst. of Brooklyn, N. Y.
AN INVESTIGATION OF A THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER IN HYPERSONIC FLOW,
by Gennaro F. Aiello. Feb 63, 39p.
Contract AF33 616 7661, Proj. 7064, Task 7064 01
ARL 63 26
Unclassified report

Report on Aerothermodynamic Investigations.

Descriptors: *Blunt bodies, *Turbulent boundary layer, Thermodynamics, Flat plate models, Model tests, Wind tunnel models, Enthalpy, Aerodynamic heating, Hypersonic flow, Hypersonic characteristics, Heat transfer.

Turbulent heating rates were measured by means of the shrouded model technique on a blunted cone at angle of attack. The Reynolds number, based on conditions at the stagnation point, was varied from 1.7 x 10 to the 6th power to approximately 3.7 x 10 to the 6th power. The enthalpy ratio (stagnation to wall) varied from 2.1 to approximately 1.5. The experimental data are compared to the flat-plate reference-enthalpy theory applied along the inviscid streamlines. It is shown that this relatively simple method is in reasonable agreement with the data. (Author)

AD-403 496 Div. 9
(TISTP/JW) OTS price $4.60

Mississippi State U., State College.
MEAN VELOCITY DISTRIBUTION IN THE OUTER LAYER OF A TURBULENT BOUNDARY LAYER,
by Tatsuya Matsui. 19 Jan 63, 41p. RR42
Contract Nonr97803
Unclassified report

Descriptors: *Turbulent boundary layer, Shear stresses, Viscosity, Fluid flow, Velocity.

The intermittent-eddy-viscosity hypothesis is proposed for the outer layer in a turbulent boundary layer flow, and it assumes an alternate appearance of zero eddy viscosity in the non-turbulent region and of a constant eddy viscosity in the turbulent region. The equation of motion is simplified by assuming the velocity defect law and that the velocity defect is small compared with the free stream velocity. With these assumptions the distributions of mean velocity and shear stress in the outer layer of a turbulent boundary layer on a flat plate for constant pressure are obtained using the intermittency factor measured by Klebanoff. The calculated results show good agreement with those measured. (Author)

AD-403 498 Div. 9, 30
(TISTP/JW) OTS price $8.60

Monsanto Research Corp., Dayton, Ohio.
FLAME SPEED DATA REDUCTION AND CORRELATION USING A DIGITAL COMPUTER,
by G. H. Ringrose, D. R. Miller, A. C. Pauls, and G. B. Skinner. Feb 63, 89p.
Contract AF33 657 7617, Proj. 6075, Task 607505
ASD TDR63 182 Unclassified report

Descriptors: *Combustion, *Flames, Measurement, Digital computers, Programming (Computers), Linear systems, Inhibition, Flame propagation, Correlation techniques, Data processing systems, Velocity.

Two digital computer routines were developed to process flame speed data resulting from the burning of compounds in air and oxygen, and to correlate particular structural configuration with flame speed. In both routines a high degree of flexibility has been incorporated to assure efficient utilization under several forseeable circumstances. The first routine, FSC, processes the raw experimental data to obtain flame speeds, equivalence ratios, and the equivalence ratio at the maximum flame speed. This information is stored on a master magnetic tape for subsequent calculations. The second routine, FSR, permits selection of specific data groups from the master tape for analysis. A linear model was chosen for the correlation. (Author)

10. FUELS AND COMBUSTION

AD-402 775 Div. 10, 25, 4, 9
(TISTA/LSK) OTS price $8.10

Virginia U., Charlottesville.
A COOPERATIVE PROGRAM OF FUNDAMENTAL RESEARCH AS RELATED TO JET PROPULSION, OFFICE OF NAVAL RESEARCH, DEPARTMENT OF THE NAVY.
Semi-annual progress rept. 1 Oct 62-31 Mar 63, 1 Apr 63, 77p.
Contract Nonr3623 00, Proj. NR098 038
Unclassified report

Descriptors: *Fluid mechanics, *Transport properties, *Reaction kinetics, *Combustion, Turbulence, Plasma physics, Plasma jets, Gas ionization, Charged particles, Ducts, Particles, Magnetohydrodynamics, Thermal conductivity, Gases, Gas flow, Solid rocket propellants, Exhaust flames, Inelastic scattering, Free radicals, High temperature research, Scientific research, Chemical equilibrium, Shock waves, Detonation waves, Decomposition, Thermodynamics, Chemical reactions.

Contents:
Fluid mechanics: Fundamental investigation of nonsteady and nonequilibrium flow, Investigation of turbulence; Transport and transfer processes: Fundamental study of dynamics of gases and plasmas, Research on thermodynamic and transport properties of gases at high temperatures and pressures, Properties of two-phase flow - electric phenomena, Thermal conductivity of gases and liquids over a range of temperatures and pressures, A study of fluid flow with suspended particles; Chemical kinetics: Theory of fast reactions, Kinetics of elementary reactions, Investigation of reaction kinetics in high-temperature gases, Reactions of ions and electronically excited species with atoms and molecules in the gas phase, High-temperature reactions, Chemical kinetics and gas dynamics of atom and free-radical reactions, Inelastic molecular collisions; Combustion phenomena: Solid-propellant flame mechanisms, Thermal conductivities of gases at high temperatures, Magnetohydrodynamics of partially ionized gases, Enthalpy fluctuations in plasma jets.

AD-402 800 Div. 10
(TISTP/MC) OTS price $11.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STABILIZATION OF A FLAME AND THE DEVELOPMENT OF THE COMBUSTION PROCESS IN TURBULENT FLOW (SELECTED PARTS).
12 Apr 63, 141p.
FTD TT62 768
Unclassified report

Trans. from Stabilizatsiya Plameni i Razvitiye Protessa Sgoraniya v Turbulentnom Potoke, Oborongiz, Moskva, pp. 31-148, 1961.

Descriptors: *Flame propagation, Flames, Fuels, Fuel sprays, Atomization, Sprays, Combustion chambers, Jet engine fuels, Stabilization, Jet flames, Turbulence, Combustion.

AD-403 443 Div. 10, 25
(TISTM/EJH) OTS price $7.60

Rohm and Haas Co., Huntsville, Ala.
ENGINEERING RESEARCH.
Quarterly progress rept., 15 Sep-15 Dec 62.
19 Apr 63, 66p. P62 27
Contract DA01 021ORD11878
Unclassified report

Descriptors: *Solid rocket propellants, *Rocket propellant grains, *Deformation, *Stresses, Cylindrical bodies, Configuration, Elasticity, Mechanical properties, Shear stresses, Loading (Mechanics), Mathematical analysis, Viscosity, Acceleration.

A numerical method of calculating deformations and stresses in an elastic solid propellant grain having a circular perforation and flat ends and bonded to a rigid motor case was used to calculate stresses and deformations caused by axial acceleration loading. Two grain end situations were considered: both ends free and one end free with the other bonded to the motor case. The dimensionless displacements of critical parts of the grain were calculated. The dimensionless radial and shear stresses at the propellant-motor case interface were also calculated as well as the percentage of total load carried by the bonded end for grains bonded on one end. Equations of motion of a viscoelastic solid were reduced to a single Poisson equation. A general solution to this equation was obtained for hollow cylinders of infinite length having generators parallel to the direction of acceleration and transverse cross sections with p(p not equal to 0) axes of symmetry. The solution was applied to solid propellant grains of infinite length with star-shaped internal perforations to determine the stresses and deformations caused by axial acceleration under the conditions of zero displacement at the outer boundary and zero surface stresses at the inner boundary. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-402 748 Div. 11
(TISTE/JBM) OTS price $16.50

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
USAF SHIELDED CAB VEHICLES TEST AND EVALUATION, by John P. La Follette and Joseph L. Dufour.
Feb 63, 251p.
Proj. 8171, Task 817104
AFSWC TDR62 137
Unclassified report

Descriptors: *Maintenance vehicles, *Recovery vehicles, *Towing vehicles, Reliability, Maneuverability, Maintenance, Nuclear propulsion, Aircraft, Tracked vehicles, Nuclear particles, Velocity, Failure (Mechanics), Safety, Operations, Desert tests, Temperature, Air force equipment, Shielding.

Three shielded-cab vehicles were tested to determine their operational capabilities in radioactive fields. Testing was concentrated on the ''Beetle,'' a shielded-cab vehicle with manipulators. The ''Masher,'' a shielded T-51 tank recovery vehicle, and the ''Bat,'' a shielded tow vehicle, were also tested. All three vehicles were tested for maneuverability, reliability of operation, operational uses, and radiation shielding integrity. The results of the tests, in general, were satisfactory. (Author)

12. GUIDED MISSILES

AD-402 612 Div. 12, 30
(TISTP/PCR) OTS price $1.10

Pacific Missile Range, Point Mugu, Calif.
AN APPROACH TO THE SEQUENCING OF RANGE OPERATIONS,
by C. E. Wisler. 23 Apr 63, 7p.
PMR TM63 4

Unclassified report

Descriptors: *Guided missile ranges, *Programming (Computers), Operations research, Sequential analysis, Equations, Operation.

This report is one of a series which consider the problems of attempting to use a digital computer as an aid in scheduling operations at the Pacific Missile Range. A theoretical treatment of one portion of the mathematical problem of scheduling is presented herein. This portion of the problem is the sequencing or ordering of compound operations on a time scale. A compound operation is a set of individual operations which can be scheduled simultaneously. The objective of the sequencing process is to arrange the operations such that the running time for the operations is minimized. Under certain assumptions, it is shown that the sequencing problem is the same as the classical traveling salesman problem. The technique of dynamic programming is discussed as a means of finding an optimal or near-optimal sequence and the problem is formulated in that structure. As developed, the model can accommodate demands for resource time which vary as a function of the ordering of operations and can incorporate priority rules for operations which must be scheduled within a certain time period of the day. (Author)

AD-402 684 Div. 12
(TISTA/GEC) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
THE SATRAK SIMULATOR,
by C. H. Bredall. 30 Mar 63, 22p. TDR169 3305 TN3
Contract AF04 695 169
SSD TDR63 63

Unclassified report

Descriptors: *Satellites (Artificial), *Orbital trajectories, Satellite attitude, Circular orbit trajectories, Design, Flight simulators.

The SATRAK Simulator (SAtellite TRajectory and Attitude Kinematic Simulator) is an instrument which can quickly measure simulated satellite aspect as a function of sensor location, satellite trajectory, satellite attitude, and time. The instrument can simulate circular orbits of altitudes from 80 to 440 nautical mile range and for any inclination angle. Design accuracy for deriving aspect angles is within two degrees. This report defines the SATRAK; describes components of the instrument; provides typical examples of its function; defines the accuracy as well as the limitations of the instrument; and discusses the type of problems which it can solve. The instrument's parts are described in detail sufficient to permit model construction. (Author)

AD-402 767 Div. 12
(TISTA/GEC) OTS price $8.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
USERS GUIDE TO PAYLOAD PLANNING FOR THE SLV-1B SPACE PROBE.
Jan 63, 89p. SLV 1B 3

Unclassified report

Descriptors: *Launch vehicles (Aerospace), *Payloads, *Space probes, Ground support equipment, Staging, Booster rockets, Rocket motors (Solid propellant), Instruction manuals, Scheduling.

This report reviews the considerations presented to an experimenter in considering or using the SLV-1B as a launching vehicle. Included are discussion of payload weights, apogees, environments, volumes, launch facilities, documentation, suggested schedules, and applicable agencies in the SLV-1B program. The SLV-1B is a relatively low cost high performance space probe, used principally for conducting relatively lightweight experiments in the region beyond 10,000 n.m. or for conducting preliminary test flights for satellite and deep space missions. The SLV-1B program utilizes an all-USAF planning, procuring, documenting, technical consulting, and launching organization. (Author)

AD-402 807 Div. 12, 6
(TISTP/RD) OTS price $2.60

Missile Div., Chrysler Corp., Detroit, Mich.
PRODUCT ASSURANCE PROGRAM TECHNICAL REPORT FOR THE RADAR CROSS-SECTION REDUCTION OF RE-ENTRY VEHICLES.
31 Mar 63, 1v. PA TR3
Contract AF04 694 25

Unclassified report

Descriptors: *Reentry vehicles, *Radar echo areas, Reduction, Reliability, Mathematical prediction, Attitude control systems, Flight control systems, Separation.

A preliminary reliability analysis and prediction summary is presented for the radar cross section reduction re-entry vehicle CCS-1FT (REX-3). The reliability analysis and prediction was performed on the separation and attitude control subsystem as presently defined. The major difference between this second generation vehicle and CS-1FT (REX-1) is that the CCS-1FT (REX-3) vehicle does not incorporate an Instrumentation Subsystem. Also, the separation and attitude control subsystem in CCS-1FT is somewhat simplified and uses a re-chargeable battery. (Author)

AD-402 810 Div. 12
(TIST/GEC) OTS price $1.60

Mitre Corp., Bedford, Mass.
THE OPTIMIZATION OF SATELLITE RECONNAISSANCE BY THE APPLICATION OF DYNAMIC PROGRAMMING TECHNIQUES.
Final rept.,
by J. A. Hunt. Apr 63, 9p. W5571
Contract AF33 600 39852, Proj. 600
ESD TDR63 168

Unclassified report

Descriptors: *Reconnaissance satellites, Effectiveness, Aerial photography, Programming (Computers), Dynamic programming, Aerial reconnaissance.

This paper points out the application of dynamic programming techniques to the optimization of a satellite reconnaissance system with a constrained picture-taking capability. The technique is illustrated by an example and a brief description of a possible implementation procedure. (Author)

AD-402 907 Div. 12
(TISTA/GEC) OTS price $4.60

Directorate of Aerospace Safety, Norton Air Force Base, Calif.
DESIGN CONSIDERATION BRIEFS, MISSILE WEAPON SYSTEM.
1963, 29p.
AFIAS S37 62

Unclassified report

Descriptors: *Guided missiles, *Rocket motors, *Guided missile components, Aviation safety, Malfunctions, Corrections, Fuel systems, Electrical equipment, Liquid rocket propellants, Solid rocket propellants, Design.

These briefs were prepared to highlight some design considerations which have or could jeopardize the safety of missile personnel and equipment. The briefs should be of special interest to the designer who does not have the opportunity to keep himself well informed on current operational and maintenance concepts and problems associated with missile systems. (Author)

AD-402 909 Div. 12, 10, 27
(TISTP/FEM) OTS price $26.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VIBRATIONAL COMBUSTION (Vibratsionnoye Goreniye),
by B. V. Raushenbakh. 16 Apr 63, 519p.
FTD TT62 942

Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury, Moskva, pp. 1-500, 1961.

Descriptors: *Combustion, *Rocket motors (Liquid propellant), *Electric power production, Vibration, Acoustics, Furnaces, Heat, Oscillation, Gases, Ramjet engines, Jet propulsion, Theory, Partial differential equations, Functions, Periodic variations, Perturbation theory, Harmonic oscillators, Jet engines.

The problem of combustion-process instability encountered in the design of liquid-fuel rocket engines, air-breathing jet engines, highly forced fireboxes in chemical electric-power plants, and in conducting various types of physical tests and experiments in combustion theory is discussed. A systematic exposition of contemporary theory of the excitation of longitudinal acoustic vibrations by application of heat is presented. The qualitative laws inherent to this type of vibration are given detailed consideration, with information from hydromechanics, acoustics and combustion theory drawn upon extensively for their analysis, with application of the mathematical apparatus of control theory and vibration theory. (Author)

AD-402 933 Div. 12, 1
(TISTA/GEC) OTS price $6.00

Flight Control Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
PROCEEDINGS OF THE OPTIMUM SYSTEM SYNTHESIS CONFERENCE, 11-13 SEPTEMBER 1962.
Feb 63, 395p.
ASD TDR63 119

Unclassified report

Descriptors: *Flight control systems, Energy management, Effectiveness, Theory, Linear systems, Nonlinear systems, Feedback, Adaptive control systems, Launch vehicles (Aerospace), Guidance, Computer logic, Programming (Computers), Aerospace craft, Descent trajectories, Reentry vehicles, Midcourse guidance, Boost-glide vehicles, Design, Symposia.

The proceedings contain a collection of 16 papers presented at the Optimum System Synthesis Conference held at the Aeronautical Systems Division 11 - 13 September 1962. The meeting was directed toward defining the present position of optimum system synthesis and determining guides for future research in both applications and theory. Most papers are concerned with various aspects of recent applications and theoretical developments in optimal control such as steepest descent techniques, suboptimal controllers, optimum filtering, and functional analysis techniques. Some earlier results are also discussed. (Author)

AD-403 057 Div. 12
(TISTP/RD) OTS price $12.50

Boeing Co., Seattle, Wash.
GOVERNMENT FURNISHED STANDARD EQUIPMENT AND MATERIALS, VAFB,
by John D. Rose. 1 Aug 62, 1v. D2 13961 2
Contract AF04 647 757

Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Strategic weapons, Materials, Maintenance equipment.

AD-403 115 Div. 12, 23, 28
(TISTW/JEA) OTS price $19.75

Rocketdyne, Canoga Park, Calif.
MISSILE SYSTEM SAFETY: AN EVALUATION OF SYSTEM TEST DATA (ATLAS MA-3 ENGINE SYSTEM),
by George A. Peters and Frank S. Hall. 1 Mar 63, 317p. R5134; ROM3181 1001
Contract AF04 694 8

Unclassified report

Descriptors: *Human engineering, *Guided missile safety, *Guided missile personnel, Reliability, Effectiveness, Guided missile (Surface-to-surface), Design, Checkout equipment, Errors, Analysis, Tests, Failures (Mechanics), Protective coverings, Weapon systems.

A significant amount of human factors data that pertained to missile system safety was accumulated during the course of various operational system test exercises. These data were in the form of incidents (deviations/difficulties), which were gathered during the direct observation of various job operations. Much of the basic data and the results of preliminary analyses have been reported previously in some 36 monthly periodic and logical function reports. The purpose of this report is to provide additional pertinent information; it was obtained as a result of further updating and detailed analyses of the data, and oriented toward the following five objectives: (1) over-all analysis and evaluation of basic data; (2) prevent recurrence of problems; (3) information for planning a system safety engineering program; (4) basic reference and training material; and (5) descriptive and explanatory information. (Author)

Division 12 - GUIDED MISSILES

AD-403 134 Div. 12
(TISTW/JEA) OTS price $5.60

Aircraft Armaments, Inc., Cockeysville, Md.
FINAL SUMMARY REPORT FOR ENGINEERING FABRICATION, ASSEMBLY AND TESTING OF THE XM 138 TRAINING WARHEAD SECTION (TYPE X).
Final rept. 6 Apr 62-28 Feb 63,
by Edward B. Tyler. 28 Feb 63, 45p. ER2724I A
Contract DA28 017 ORD5060
Unclassified report

Descriptors: *Guided missile warheads, Structural properties, Specifications, Weight, Gravity, Quality control, Adapters, Engineering, Test equipment (Electronics), Training devices, Design.

Research is concerned with engineering, fabrication and testing of eighteen (18) XM 138 Training Warhead Sections (Type X(U)) as well as interface and mono-detail drawings of the device. Most items were completed according to schedule with no unusual problems or circumstances. Problem areas appeared primarily in the testing phases. The production electrical test equipment originally requested by Picatinny Arsenal was never constructed due to lack of design incompatible with warhead, or lack of revision and approval. These events occurred at different times with the result that all warheads were completed and tested, using laboratory equipment, rather than delay the delivery of the completed warheads. (Author)

AD-403 285 Div. 12
(TISTP/MC) OTS price $23.50

Boeing Co., Seattle, Wash.
GOVERNMENT FURNISHED STANDARD EQUIPMENT AND MATERIALS, WING I,
by Harry B. Carratt. 13 June 62, 418p. D2 13961
Contract AF04 647 289
Unclassified report

Descriptors: *Guided missile components, Maintenance, Maintenance equipment, Guided missiles (Surface to surface), Materials.

AD-403 287 Div. 12, 25
(TISTP/JEA) OTS price $10.10

Electro Jet Corp., Washington, D. C.
SATELLITE PLASMA SHEATH ANOMALIES.
Final rept.,
by S. Fred Singer. 1961, 1v.
Contract NObsr84714
Unclassified report

Reprint from Electro-Jet Corporation.

Descriptors: *Satellites (Artificial), *Plasma physics, Search radar, Magnetohydrodynamics, Radio waves, Magnetic fields, Earth, Wake, Electromagnetic waves, Plasma sheath, Spheres, Electromagnetic wave reflections, Velocity, Motion, Ions, Radar echo areas, Distribution, Density, Flight paths, Trajectories, Detection, Mechanics.

Contents:
Experimental studies of the Kraus Effect
Plasma sheath and screening around a rapidly moving body
Plasma compression effects produced by space vehicles in a magneto ionic medium
Reflection of radio waves incident to boundary surfaces with application to the theory of the Kraus Effect
Interaction of West Ford Needles with the Earth's magnetosphere
Further on the interaction of West Ford Needles with the Earth's magnetosphere
The generation of electromagnetic waves in the wake of a satellite

AD-403 387 Div. 12, 14, 25
(TISTA/GEC) OTS price $3.50

Fenwal Inc., Ashland, Mass.
FIBER OPTICS IN AEROSPACE VEHICLE HAZARD DETECTION.
Final rept. 8 Mar 61-30 June 62,
by Alan C. Traub. Dec 62, 212p.
Contract AF33 616 8165, Proj. 6075, Task 607506
ASD TDR62 731
Unclassified report

Report on Investigation of Fiber Optics for Hazard Detection.

Descriptors: *Aerospace craft, Hazards, Detection, Waveguides, Electromagnetic waves, Glass textiles, Fire alarm systems, Flames, Photoelectric cells, Optics, Fiber optics.

Light-transmitting glass fiber bundles in various configurations have been subjected to extensive optical, mechanical and thermal testing and to various other analyses. The report provides important information on fiber optic characteristics as well as design considerations for developing optimum systems. System configurations are recommended which would extend the capabilities of the basic fiber bundle in meeting the diverse requirements of installation, operation and maintenance in various applications. An experimental fiber optic system for flame detection is described. It uses a 25 foot long bundle and incorporates a special photoelectric detection system and other embodiments of our findings. (Author)

AD-403 433 Div. 12, 27
(TISTA/LSK) OTS price $4.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
SIMPLIFIED ANALYSIS OF FLEXIBLE BOOSTER FLIGHT CONTROL SYSTEMS.
by Lee Gregor Hofmann and Allen Kezer. June 62, 43p. E1210
Contract AF04 647 303
Unclassified report

Descriptors: *Adaptive control systems, Elasticity, Guided missiles (Surface to surface), Mathematical analysis, Equations, Motion, Booster rockets, Launch vehicles (Aerospace).

Structural flexibility effects exert a considerable influence upon the stability of booster orientation flight control systems. This paper presents a relatively simple method of using root locus techniques to develop the factored open loop relating function for the system including these flexibility effects. The analysis procedure is very useful in the design of these control systems since the solution to the stability problems encountered becomes evident from the form of the factored open loop relating function. The particular manner in which the development takes place enables one to understand the effects of the major design and physical parameters upon the form of the open loop relating function, and in so doing, bridges the gap between these parameters and their effect on the

performance of the closed loop system. Armed with the basic understanding which the analysis procedure provides, it is possible to interpret the performance of a parameter adjusting adaptive control system or to formulate rapidly the preliminary design of a fixed parameter flight control system. (Author)

AD-403 462 Div. 12, 14
(TISTA/LSK) OTS price $2.00

General Electric Co., Philadelphia, Pa.
REPAIR OF LEAKS IN AN AEROSPACE ENVIRONMENT.
Final rept. 19 Feb-12 Oct 62,
by D. J. Withey. Feb 63, 167p. 62SD826
Contract AF33 657 7852, Proj. 8170, Task 817005
ASD TDR62 1015

Unclassified report

Report on Logistics, Maintenance, and Support Techniques.

Descriptors: *Gas leaks, Maintenance, Sealing compounds, Ionization gages, Gas detectors, Penetration, Spacecraft, Plastic seals, Spacecraft cabins, Detection.

A study was made to determine the optimum method for the detection, location and repair of leaks in a manned space vehicle cabin. The hazards existing in the aerospace environment that could cause leaks were defined. The requirements for the system were established and an optimum system evolved from a trade off of many proposed techniques. The optimum system utilizes cold cathode ionization gauges mounted on the outside (i.e., vacuum or space side) of the cabin wall to detect leakage through the wall by sensing a minute increase in pressure. Separate warning indicators are mounted in back of the detectors, on the inside of the wall. Thus, when a leak occurs, the crew immediately knows the general location of the leak. Wall coverage area for each detector-warning unit and system weight, as well as the minimum detectable leak can be varied to suit an individual vehicle. Location of small leaks and faulty seals is accomplished with He as a tracer gas. When a small jet of He is directed over the leak, the current in the detector drops. Larger leaks are pinpointed visually, and/or by the audible noise generated. A decompression warning system is provided to signal the presence of the very large punctures. Repair of seals is best accomplished by application to the junction of the component and cabin wall of a liquid sealant. Repair of small punctures is best obtained with a putty adhesive sealant. A self-brazing plug is optimum for the repair of larger punctures. For repair of large punctures in tight corners, a metal patch mechanically secured is optimum. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-402 592 Div. 13
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BK-1425 ERECTING TOWER CRANE WITH A SEVENTY-FIVE TON LIFTING POWER,
by I. B. Gitman and L. N. Shchipakin. 8 Apr 63, 16p.
FTD TT63 279

Unclassified report

Trans. from Novaya Tekhnika Montazhnykh i Spetsial'nykh Rabot v Stroitel'stve, No. 9, pp. 5-10, Sep 59.

Descriptors: *Hoists, Booms, Construction, Load distribution, Towers.

AD-402 685 Div. 13, 20
(TISTE/JBM) OTS price $6.60

Technical Operations, Inc., Burlington, Mass.
THE EFFECT OF INTERIOR PARTITIONS ON THE DOSE RATE IN A MULTISTORY WINDOWLESS BUILDING,
by Albert W. Starbird, Joseph D. Velletri, Robert L. MacNeil, and John F. Batter.
31 Jan 63, 54p. TO B63-6
Contract OCD OS62 14

Unclassified report

Descriptors: *Radioactive fallout, *Buildings, *Shelters, Nuclear explosions, Panels (Structures), Structures, Structural properties, Cobalt, Configuration, Gamma rays, Radiation hazards, Shielding, Steel, Models (Simulation), Dose rate, Test methods.

An evaluation was made of the effects of three common types of interior partitions within multistory structures on the dose rates from infinite uniform fields of fallout contamination. Comparisons are made between experimentally determined steel model results utilizing cobalt-60 gamma radiation and those obtained through use of the OCD engineering manual entitled ''Design and Review of Structures from Fallout Gamma Radiation.'' A comparison is also made between partition results from limited fields of contamination and previous experimentally determined limited-field results for similar structures without partitions. Agreement is excellent between experimentally measured and computed infinite-field dose rates for the three partition geometries compared -- typical box, corridor, and compartment types. (Author)

AD-403 113 Div. 13
(TISTP/RD) OTS price $12.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
BLAST LOADING OF SMALL BURIED ARCHES.
Final rept.,
by J. R. Allgood, C. R. White, R. F. Swalley, and H. L. Gill. 3 Apr 63, 169p.
Projs. Y F008 10 108 and Y F008 10 402
NCEL R216

Unclassified report

Descriptors: *Underground structures, Soil mechanics, Stresses, Instrumentation, Design, Blast, Tests.

Research is presented to gain information which will serve as a guide in developing design methods for underground structures. In pursuit of this goal, preliminary tests have been conducted on small buried arches to determine the influence of the dominant parameters. Information has been obtained on the response to long-, medium-, and short-duration blast loads including the deflection, thrust, and moment patterns. One static test also was performed. Curves showing the form of arching under static and blast loading are given. In addition, buckling and the variation of interface pressure are discussed briefly. The response of the buried arches consisted primarily of a body motion upon which was superimposed the first inextensional symmetrical mode of vibration. As the entire structure moved downward, the sides moved outward slightly and then inward.

It was evident that the passive pressures which developed on the sides played the dominant role in providing resistance. It has been found that in static tests some of the surface load is carried by arching through the soil. In the dynamic tests the inertial forces of the soil above the arch were found to be important. The inertial load overcame the soil shear resistance so that a load approximately equal to the surface load acted on the structure. A model analysis of the system and subsequent comparison of the deflections from the small-structure tests and the Operation Plumbbob Structure 3.3 tests indicate that modeling of deflections is possible. (Author)

AD-403 325 Div. 13
(TISTA/GEC) OTS price $3.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION A/E 32C-2 AIR CONDITIONER.
Apr 63, 28p.
TAC TR62 52 Unclassified report

Descriptors: *Air conditioning equipment, Temperature control, Tests, Military requirements, Operation, Coolant, Halogenated hydrocarbons, Mobile, Portable, Acceptability.

Tactical Air Command has a requirement for lightweight, mobile (transportable) temperature environmental control equipment to control temperatures within Air Weapons Control System (AWCS) mobile shelters. The equipment must be capable of providing cooling and heating to various transportable shelters, i.e., M-1948, S-80, S-82, Quick Erection Domes (QED) and S-205/T nflatable shelters. The AiResearch A/E32C-2 Air Conditioner proved to be an adequate environmental control unit. Results produced during the tests of the cooling, heating and ventilation modes were highly satisfactory. Variation between desired and actual temperatures averaged between one and two degrees Fahrenheit, and time trials demonstrated that the air conditioner rapidly brought the test environment areas to desired temperature levels. In addition, because of its high airflow rate, the unit was found to be an excellent inflating device for inflating Quick Erection Domes (QED) shelters. (Author)

AD-403 445 Div. 13, 30, 26
(TISTM/ODN) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
CRYOGENIC-SOLID COOLING TECHNIQUES.
Interim engineering rept. 1 Jan-31 Mar 63,
by U. E. Gross. Apr 63, 6p. 0694 01 3
Contract AF33 657 8863
Unclassified report

Descriptors: *Hydrogen, *Neon, *Liquefied gases, *Solidified gases, Coolants, Cooling, Density, High vacuum valves, Low pressure research, Valves, Test methods, Test equipment, Cooling and ventilating equipment, Cryogenics, Preparation.

The technique evolved for solidifying liquid hydrogen and neon to the desired density is described herein as are the evaluation of a prototype model pressure-control valve and completion of the deliverable model of the cryogenic-solid cooler. (Author)

14. MATERIALS (NON-METALLIC)

AD-402 693 Div. 14, 17
(TISTM/PCR) OTS price $3.60

Owens-Corning Fiberglas Corp., Newark, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
Quarterly progress rept. no. 7, 15 Mar-15 June 57,
by Herbert B. Ailes. 5 July 57, 30p.
Contract NOrd15764
Unclassified report

Descriptors: *Composite materials, *Glass textiles, Metals, Aluminum coatings, Vacuum apparatus, Injectors, Forging, Driers (Apparatus), Molding, Aluminum alloys, Creep, Stresses, Absorption, Water, Centrifugal casting, Theory, Temperature, Manufacturing methods, Photographs, Glass, Metal coatings.

The major efforts have been in the following directions: Improving existing and investigating new methods of forming and working composites of aluminum and aluminum coated glass fibers; Determining a complete set of physical data on a standard glass-reinforced aluminum composite in order to indicate the general characteristics of glass-reinforced metals as a class of materials; Developing a method of forming composites of aluminum and bare glass fibers and evaluating the physical properties of these composites; Production and testing of glass-reinforced aluminum tubular shapes; Developing a theory on the interaction of metals and glass fibers; and Developing a glass-reinforced metal having utility at temperatures about 1000 F. (Author)

AD-402 709 Div. 14, 4
(TISTM/TCG) OTS price $3.60

Aeronautical Engine Lab., Naval Air Material Center, Philadelphia, Pa.
DEVELOPMENT AND FORMULATION OF EXPERIMENTAL DIISOCYANATE-BASED LAMINATING RESINS.
Final rept.,
by A. P. Bonanni. 13 Mar 63, 3p. AML 1636
WEPTASK RRMA 03 017/200 1/R007 04 01
Unclassified report

Descriptors: *Isocyanate plastics, *Halocarbon plastics, *Laminated plastics, *Organic compounds, Mechanical properties, Temperature, Halogenation, Elasticity, Synthesis (Chemistry), Stability.

The successful synthesis of halogenated polyurethane resins for laminating is reported. The test results indicate that halogen groupings in a polyurethane resin, tend to increase the thermal stability of the resulting laminate and to increase the pot-life of the resin. Future efforts will be directed toward improving stability above 300 F of the polyurethane structural laminate. (Author)

AD-402 714 Div. 14
(TISTM/PCR) OTS price $8.10

SOLAR, San Diego, Calif.
EXPLORATION AND EVALUATION OF NEW GLASSES IN FIBER FORM.
Final rept. 15 Nov 61-25 Nov 62,
by Gunther K. Schmitz and A. G. Metcalfe.
12 Apr 63, 1v. RDR 1266 7; TM 215
Contract Nonr3654 00, Proj. 62 R05 19A
Unclassified report

Descriptors: *Glass textiles, Failure (Mechanics), Glass, Damage, Statistical analysis, Test methods, Tables, Tensile properties.

The length effect on fiber strength was studied for E-glass and 994 glass fibers. These fibers were primarily from strands. Tensile test results confirmed the linear log strength-log length relationship previously established and that fiber strength increases with decreasing length. At short fiber lengths (below 0.5 cm) the strength-length curve showed a change in slope due to the presence of mixed flaw populations, which were indicated in bi-modal failure distributions in the vicinity of the slope change. This change in slope was not anticipated in an earlier concept developed for failure prediction on the basis of the length effect. A tentative revised model is suggested but must await confirmation by experiments with controlled fiber damage. Some comparative tests on strand strength showed a strength reversal with decreasing test length. The reversal could be related to the effect of fiber collimation. Comparison of fiber properties of the different glasses on the basis of strength, weight, Young's modulus, surface damage, and fiber length showed that 994 fibers are superior to E-glass by a factor of approximately 1.7 for longer fibers. (Author)

AD-402 755 Div. 14, 4
(TISTM/SJR) OTS price $7.60

New York U. Coll. of Engineering, N. Y.
DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
Rept. for 16 Aug-15 Nov 62.
14 Dec 62, 73p. TR3
Contract NOw62 0647
Unclassified report

Descriptors: *Organic substances, *Hydraulic fluids, *Titanium compounds, Viscosity, Flammability, Aliphatic compounds, Aromatic compounds, Organic phosphorus compounds, Catalysts, Silicon compounds, Fluorides, Test methods, Metalorganic compounds.

Special effort was directed to the question of the fire safety of the experimental fluid, and how far this can be influenced and evaluated. The ASTM method of determining the flash and flame points by heating a sample to a high enough temperature to cause the flash and flame effect does not express the safety conditions of contact with open flames when the fluid itself is held below the high ranges of 550-600 F such as are found for these materials. The synthesis work was directed at producing fluids with as-far-as-possible complete removal of low boiling cuts, so as to decrease short flashes of low cuts below the flame point. Also, work was directed at increasing the self-extinguishing properties after a short burning has taken place by the incorporation of phosphorus, halogen, or nitrogen, or combinations of these. (Author)

AD-402 779 Div. 14, 30
(TISTM/PCR) OTS price $9.10

Illinois U., Urbana.
THE ENERGY ABSORPTION CAPACITY OF GRANULAR MATERIALS IN ONE-DIMENSIONAL COMPRESSION.
Final rept.,
by Alfred J. Hendron, Jr., Robert E. Fulton, and Bijan Mohraz. Jan 63, 198p.
Contract AF29 601 4302, Proj. 1080, Task 108001
AFSWC TDR62 91
Unclassified report

Descriptors: *Energy, *Sand, *Compressive properties, Deformation, Blast, Soil mechanics, Stresses, Theory, Strain gages, Tests, Test equipment, Equations, Numerical analysis, Materials, Absorption.

Energy absorbing mechanisms in sand subjected to one-dimensional compression are reported. For pressures below crushing of the grains, a granular medium of equal radii elastic spheres in a face-centered cubic array is analyzed. Expressions are obtained for the axial stress-strain curve, constrained modulus, coefficient of earth pressure at rest, and relationship between absorbed energy and input energy for one cycle of loading. The energy absorbed as a result of crushing is considered by analyzing statistical relationships between changes in grain size distribution curves and the new surface areas created. An apparatus is described which has the capability of maintaining conditions at zero radial strain under increasing axial stress. The lateral stresses developed under these conditions are measured. Preliminary experimental results are presented for one sand which show the variation of the coefficient of earth pressure at rest and the stress-strain relationships with initial void ratio, overconsolidation ratio, and strain rate. A correlation of theory and test results is presented. (Author)

AD-402 783 Div. 14
(TISTM/PCR) OTS price $6.60

Owens-Corning Fiberglas Corp., Newark, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
Quarterly progress rept. no. 8, 15 June-15 Sep 57,
by Herbert B. Ailes. 30 Sep 57, 60p.
Contract NOrd15764
Unclassified report

Descriptors: *Composite materials, Material forming, Glass textiles, Aluminum, Aluminum coatings, Aluminum alloys, Casting, Casting alloys, Balloons, Vacuum apparatus, Injection, Compressive properties, Production, Theory, High temperature research, Glass, Metals.

Contents
New methods of forming and working composites of aluminum and aluminum coated glass fibers
Physical data on a standard glass-reinforced aluminum composite
Composites made by the vacuum injection method
Production and testing of glass-reinforced aluminum tubular shapes
Theory on the interaction of metals and glass fibers
Glass-reinforced metal having utility at temperatures above 1000 degrees farrenheit

AD-402 785 Div. 14
(TISTM/PCR) OTS price $6.60

Owens-Corning Fiberglas Corp., Toledo, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
Annual progress rept. no. 4, 15 Mar 58-15 June 59,
by P. A. Lockwood. 15 June 59, 1v.
Contract NOrd15764
Unclassified report

This report includes: A Derivation of the Stress-Strain Relationship of Composite Bars, by Edward Saibel and I. G. Tadjbakshs. 28 May 59.

Descriptors: *Composite materials, High temperature research, Metal coatings, Glass textiles, Theory, Stresses, Silicon, Copper, Tensile properties, Aluminum, Nickel, Lead alloys, Zinc coatings, Aluminum alloys, Thermal expansion, Equations, Mathematical analysis, Glass, Metals.

Division 14 - MATERIALS (NON-METALLIC)

Contents:
Development of glass-metal composites for elevated temperature service
Research into strength of metal-coated glass fibers and methods of improving the coated fiber strength
Research into composites
Theoretical studies of glass-metal composites
A derivation of the stress-strain relationship of composite bars

AD-403 122 Div. 14, 26, 30
(TISTM/PCR) OTS price $1.60

Vermont U., Burlington.
ON THE STRENGTH DEGRADATION OF FILAMENT WOUND PRESSURE VESSELS SUBJECTED TO A HISTORY OF LOADING,
by John O. Outwater and Willard J. Seibert.
22 Apr 63, 9p. TM196
Contract Nonr321901, Proj. 62R05 19A
Unclassified report

Descriptors: *Pressure vessels, Degradation, Loading (Mechanics), Fibers, Stresses, Theory, Mathematical analysis, Equations, Tests, Mathematical prediction, Filament wound construction.

If it is assumed that the rate of growth of a Griffith crack that controls the strength of a fiber is proportional to a power of the stress on that fiber we can predict that the ultimate strength of a filament wound pressure vessel decreases linearly with the time at a given load and also that the time to failure when the vessel is held at a given load will increase logarithmically. Both these observations are confirmed experimentally and form the basis for a simple method of predicting the life of a vessel at one load after it has been held for a given time at another. (Author)

AD-403 331 Div. 14, 17
(TISTM/AMS) OTS price $4.60

Owens-Corning Fiberglas Corp., Newark, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
Quarterly progress rept. no. 9, 15 Sep-15 Dec 57,
by Herbert B. Ailes and A. R. Canady. 5 Jan 58, 48p.
Contract NOrd15764
Unclassified report

Descriptors: *Glass textiles, *Reinforcing materials, *Composite materials, Copper, Copper alloys, Aluminum, Aluminum alloys, Low-pressure research, Tensile properties, Compressive properties, Stresses, Resistance (Electrical), High-temperature research, Casting, Mechanical working, Grain structure (Metallurgy), Brittleness, Powder metallurgy, Ultrasonic radiation, Thermal stresses, Pipes, Theory, Thickness, Rupture, Impregnation, Cylindrical bodies, Metal coatings.

AD-403 345 Div. 14
(TISTM/AMS) OTS price $1.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE REFRACTORY OXIDES.
Quarterly progress rept. no. 3,
by T. Vasilos, R. M. Spriggs and J. B. Mitchell.
29 Apr 63, 15p. SR63 80
Contract Now62 0648
Unclassified report

Descriptors: *Ceramic materials, *Refractory materials, Aluminum compounds, Magnesium compounds, Oxides, Fractography, Mechanical properties, Grain structure (Metallurgy), Elasticity, Experimental data, Rupture, Mechanical properties, Heat treatment, High temperature research, Microstructure.

Alumina and magnesia specimens were prepared having grain sizes from 20 to 300 microns. Transverse bend strength and elastic modulus determinations were made on 50-, 100-, and 300-micron grain-size alumina and 70- and 100-micron magnesia specimens. The strength of alumina showed a strong grain-size dependence at all test temperatures. The strength at higher temperatures appeared to be more temperature-dependent in the finer-grain specimens. The strength of magnesia appeared to be essentially independent of grain size up to approximately 700 C; effect of grain size on strength at higher temperatures is presently inconclusive. The effect of grain size on the elastic modulus is at present in doubt due to a possible calibration error in the recording instrument. The present data indicate that the high-temperature elastic modulus of alumina is more temperature-dependent in the finer-grain-size specimens. (Author)

AD-403 355 Div. 14, 4
(TISTM/EJH) OTS price $2.00

New York U., Coll. of Engineering, N. Y.
DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
Rept. for 16 Nov 62-28 Feb 63.
15 Mar 63, 76p. TR 4
Contract NOw62 0647
Unclassified report

Descriptors: *Hydraulic fluids, *Metalorganic compounds, Friction, Stability, Viscosity, Oxidation, Titanates, Borates, Tin compounds, Silanes, Silicon compounds, Catalysts, Synthesis (Chemistry), Chemical reactions, Combustion, Tables, Experimental data, Low temperature research.

Two special modifications of the fluid tetra-isopropyltitanate/basic zincoctoate reaction product were developed with the aim to produce increased stability under the test requirements for a hydraulic fluid while maintaining fire safety conditions. These products are modifications of the product with tetra butyl tin and a modification of the product with tri-isopropyl borate. Special attention was given to the relationship between the diluted mixtures of these products, using inhibited silicone fluid 510 as diluent, and four-ball wear-test scar marks, and also to viscosity changes at low temperatures. (Author)

AD-403 360 Div. 14
(TISTM/PCR) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
THERMAL STUDIES OF REINFORCED-PLASTIC MATERIALS. PART I. DIFFUSIVITY OF FIVE REINFORCED-PLASTIC HEAT BARRIERS,
by W. E. Donaldson and T. T. Castonguay. Feb 63, 16p.
NOTS TP2936, NAVWEPS 7918
Unclassified report

Descriptors: *Laminated plastics, Ablation, Radiant heating panels, Test methods, Test equipment, Photographs, Mathematical analysis, Thermal conductivity, Specific heat, Density, Phenolic plastics, Graphited materials, Textiles, Asbestos, Silicone plastics, Plasma jets, Mathematical models, Thermal diffusion.

This report discusses the thermal properties of reinforced-plastic laminates at high temperatures. Thermal diffusivity data are given for five different laminates, and the ablation rate in mils per second is given for 15 different laminates. (Author)

AD-403 361 Div. 14, 4
(TISTM/PCR) OTS price $1.25

Plastics Lab., Princeton U., N. J.
PIEZO-RESISTIVE CHARACTERISTICS OF SOME ORGANIC SEMICONDUCTING POLYMERS,
by A. W. Henry and C. Cappas. 15 Apr 63, 40p.
TR 67A
Contract DA31 124AROD21, Proj. ONR 356 375
Unclassified report

Descriptors: *Polymers, *Piezoelectric effect, Resistance (Electrical), Tellurium, Pressure, Aromatic compounds, Electrical conductance, Thermoelectricity, Test equipment, Semiconductors, Organic compounds.

A series of highly conjugated polymers with semiconducting characteristics was examined to determine the piezo-resistive behavior. The resistivities, ranging from 100 to 10 to the 11th power ohm-cm at room temperature and 1840 atmospheres pressure, decreased 100 and, for some polymers, 1000 fold as the pressure was increased to 35,000 atmospheres. Elimination of voids and particle-to-particle contact problems was obtained by the extreme pressures used. A correlation between the extrapolated activation energy for the polyacene quinone radical (PAQR) polymers and the number of fused rings in the aromatic portion of the polymer was obtained. An elemental polymeric semiconductor with high conductivity (i.e. p-type tellurium), was also observed to have a decreasing thermoelectric power with increased pressure and a relatively constant activation energy, both due to the p-type TeO2 impurity. (Author)

AD-403 446 Div. 14, 26
(TISTM/PCR) OTS price $11.50

Corning Glass Works, N. Y.
PILOT PRODUCTION OF GLASS CRYSTAL HOLDERS HC-(XM-2)/U; HC-(XM-3)/U; HC-(XM-4)/U.
Final rept. May 58-Sep 62,
by R. K. Whitney. Sep 62, 129p.
Contract DA36 039sc81255
Unclassified report

Descriptors: *Crystal holders, Specifications, Materials, Seals (Stoppers), Glass seals, Manufacturing methods, Industrial equipment, Photographs, Pictures, Glass.

A review of requirements, dimensions, and materials is presented with the resultant specification for glass holders. Fundamental glass properties and sealing characteristics are presented. Description of sealing equipment used, plus the process procedures gone through during the preparation of pre-production samples is described. A review of major steps taken for each glass crystal holder is made. (Author)

15. MATHEMATICS

AD-402 617 Div. 15
(TISTP/FEM) OTS price $5.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
A DUALITY THEOREM FOR A CLASS OF CONTINUOUS LINEAR PROGRAMMING PROBLEMS.
Doctoral thesis,
by William F. Tyndall. 1963, 51p. TR1
Contract Nonr562 15
Unclassified report

Descriptors: *Linear programming, *Matrix algebra, Functions, Integral equations, Inequalities, Topology.

AD-402 643 Div. 15, 26
(TISTP/MFA) OTS price $3.60

System Development Corp., Santa Monica, Calif.
DUALITY AND NETWORK FLOW,
by W. Karush. 15 Mar 63, 38p. TM 1042_201 00
Unclassified report

Descriptors: *Mathematical prediction, *Linear programming, Operations research.

The report describes the notions of duality and network flow and shows how these are used in the construction of algorithms for certain classes of LP (linear programming) problems. Reports that the problems include the transportation problem network flow at minimum cost, and scheduling of activities at minimum cost in a PERT-like, or critical-path, system of project organization. (Author)

AD-402 644 Div. 15
(TISTP/FEM) OTS price $3.60

Iowa State U., Iowa City.
SOME ASPECTS OF CONSTRAINED RANDOMIZATION.
Interim technical rept.,
by Gary J. Sutter, George Zyskind, and Oscar Kempthorne. Jan 63, 30p.
Contract AF33 616 8269, Proj. 7071, Task 7071 01
ARL 63 18 Unclassified report

Report on Mathematical Techniques of Aeromechanics.

Descriptors: *Combustorial analysis, *Statistical functions, Least squares method, Errors, Statistical distributions, Statistical tests, Matrix algebra.

The definition of constrained sets of plans and the problems to be considered are given. A correspondence between constrained sets of plans and RT x RT square arrays and a correspondence between constrained sets of plans and resolvable balanced incomplete block designs are given. These correspondences led to the enumeration of many constrained designs. Some relationships between the variance of the error sum of squares under complete randomization and under constrained randomization are given. The power of the randomization test under constrained randomization was considered for nearly linearly, randomly, and semi-randomly distributed basal yields. The empirical results exhibit a tendency of the sensitivity of the test for the detection of treatment differences to increase with decreases in the variance of the error sum of squares of the constrained sets. (Author)

AD-402 645 Div. 15
(TISTP/MB) OTS price $1.60

System Development Corp., Santa Monica, Calif.
ON RELIABILITY INFERENCE,
by E. L. Pugh. 15 Mar 63, 16p. TM-1042/202/00
Unclassified report

Descriptors: *Mathematical prediction, *Reliability, Operations research, Probability.

The report states that an important aspect of any system is its reliability, or its probability of successful operation. The report also states that such a probability (R), is never known exactly in practice but may only be approximated by an estimate (R), based on either a subjective probability analysis or on an analysis of actual failure history of the system. The report states that if the estimate R is based on failure history, its accuracy can be precisely quantified in the form of conference; this paper is concerned with such quantification under various assumptions regarding the failure law (including the case of no assumption). (Author)

AD-402 663 Div. 15
(TISTP/MC) OTS price $1.10

System Development Corp., Santa Monica, Calif.
A SEQUENTIAL PROCEDURE FOR SUCCESSIVELY IMPROVING SAMPLING DISTORTIONS.
Preliminary rept.,
by Charles E. Clark. 18 Mar 63, 6p. TM94253
Unclassified report

Descriptors: *Sampling, Probability, Statistical processes, Monte Carlo method.

This is a working paper in the field of mathematical statistics. It deals with the theory of a sequential procedure for successively improving sampling distortions.

AD-402 694 Div. 15
(TISTP/FEM) OTS price $8.10

North Carolina State Coll., School of Physical Sciences and Applied Mathematics, Raleigh.
DUAL SERIES RELATIONS,
by Ian N. Sneddon. 81p.
Contract AF49 638 1159
Unclassified report

Descriptors: *Series, *Mathematical analysis, Cylindrical bodies, Spheres, Polynomials, Bessel functions, Integral equations, Functions, Difference equations, Partial differential equations, Thermal conductivity, Boundary layer, Trigonometry.

AD-402 778 Div. 15
(TISTP/WH) OTS price $8.60

Coordinated Science Lab., U. of Illinois, Urbana.
RATIONAL FUNCTION APPROXIMATION OF POLYNOMIALS WITH EQUIRIPPLE ERROR,
by DeVerl Humpherys. Feb 63, 90p. R-159
Contract DA36 039sc85122 Proj. 3 99 01 002
Unclassified report

Descriptors: *Polynomials, *Functions, Networks.

A method was proposed whereby any polynomial can be approximated in an equiripple manner by a rational function. The properties and form of this rational function are discussed. Several examples are used to illustrate the theory. Most of these examples are chosen so that the approximating rational function can be identified as a network function part; in particular, the group delay was given special emphasis. The ideal group delay vs. frequency characteristic of filter is a constant. This type of group delay is approximated in an equiripple manner. In addition, a numerical scheme is proposed such that from a given crude equiripple approximation a more exact solution can be obtained. An example used to illustrate this approach is the problem of compensating the non-constant group delay characteristics of a sharp-cutoff, low-pass filter. (Author)

AD-402 790 Div. 15
(TISTP/WH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
THE AUTOCORRELATION AND JOINT DISTRIBUTION FUNCTIONS OF THE SEQUENCES, $\{\frac{a}{m} j^2\}$, $\{\frac{a}{m}(j+\tau)^2\}$.
Technical memorandum,
by D. L. Jagerman. 15 Mar 63, 34p. TM1042 203 00
Unclassified report

Descriptors: *Sequences, *Monte Carlo methods Series, Statistical distributions, Statistical functions, Numerical methods and procedures.

The present-day extensive use of Monte Carlo procedures necessitates the careful investigation of methods for the generation of random numbers. In its simplest form, the underlying principle of all Monte Carlo procedures finds its expression in the following theorem: let $(x_j)_1^\infty$ be a sequence equidistributed over (0,1), and let f(x) be a function Riemann integrable on (0,1); then $\sum_{j=1}^{N} f(x_j) \sim N \int_0^1 f(x)\,dx$. (Author)

AD-402 804 Div. 15
(TISTP/MC) OTS price $1.10

Washington U., Seattle.
A NEW TYPE OF VECTOR FIELD AND INVARIANT DIFFERENTIAL SYSTEMS,
by H. H. Johnson. 8 Jan 63, 7p. TR18
Contract Nonr477 15, Proj. NR043 186
Unclassified report

Descriptors: *Mathematics, *Analysis, *Partial differential equations, Groups (Mathematics), Topology.

The concept has been introduced of tangent vector fields on the space of maps of one manifold into another. A special type of these are the ''k-vector fields'' of which the author previously defined the bracket and exponential. This paper explores further the analogy with classical continuous groups. Specifically, this treats systems of partial differential equations under k-vector fields. (Author)

AD-402 806 Div. 15
(TISTP/TL) OTS price $1.60

Washington U., Seattle.
BRACKET AND EXPONENTIAL FOR A NEW TYPE OF VECTOR FIELD,
by Harold H. Johnson. 14 Dec 62, 13p. TR17
Contract Nonr47715, Proj. NR043 186
Unclassified report

Descriptors: *Algebraic topology, Groups (Mathematics), Taylor series, Vector analysis, Series, Integrals, Partial differential equations, Numbers.

AD-402 825 Div. 15, 25
(TISTP/MC) OTS price $4.60

Minnesota U., Minneapolis.
STATISTICAL RESPONSE OF A BAR IN TENSION.

Final rept. July 59-Sep 61,
by D. A. Smith, T. I. Smits, and R. F. Lambert.
Apr 62, 38p.
Contract AF33 657 7453, Proj. 7351, Task 735106
ASD TDR62 379

Unclassified report

Descriptors: *Tensile properties, Statistical distributions, Statistical analysis.

Theoretical and experimental statistical analysis of the random response of a continuous bar in tension is presented. Particular attention has been paid to the probability distribution of the strain response which, for a linear second-order system under gaussian excitation, follows a Rayleigh distribution. However, when the excitation level of the clamped-clamped continuous bar is sufficiently high so that the tensile strain becomes comparable with the bending strain, then the strain crest distribution no longer follows the Rayleigh prediction. At high strain levels the distribution of positive crests as well as maxima is greater than the Rayleigh prediction and the distribution of negative crests as well as minima is less. The distribution of positive maxima falls below the positive crest distribution as the Q of the system decreases. Similarly the distribution of negative minima falls below the negative crest distribution as the Q decreases. (Author)

AD-402 845 Div. 15
(TISTP/MFA) OTS price $1.10

Washington U., Seattle.
LIE GROUPS ASSOCIATED WITH PSEUDO GROUPS,
by Harold H. Johnson. 14 Dec 62, 6p. TR15
Contract Nonr477 15 , Proj. NR043 186

Unclassified report

Descriptors: *Groups (Mathematics), Transformations (Mathematics), Functions, Algebraic topology, Partial differential equations, Targets, Analysis.

Relations between Gk and G sets is the main concern of this paper. Conditions will be imposed on G of two types. The first is special and imposes a restriction on the types of pseudo groups studied. The rest are regularity conditions and seem to have been assumed or proved previously for the pseudo groups studied. (Author)

AD-402 950 Div. 15
(TISTP/MC) OTS price $3.60

RAND Corp., Santa Monica, Calif.
CONCEPTS AND THEORIES OF PURE COMPETITION,
by Lloyd S. Shapley and Martin Shubik. May 63,
34p. RM3553PR
Contract AF49 638 700

Unclassified report

Descriptors: *Economics, *Games theory.

A classical formulation of the marketplace is examined from three different theoretical viewpoints, and the three solutions that result are contrasted. When the number of participants is small, the solutions are very different, both in their form and in their quantitative predictions. As the size of the market increases, however, they all converge to a common solution, despite the wide disparity in the underlying assumptions. (Author)

AD-403 282 Div. 15
(TISTP/FR) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
A METHOD FOR THE NUMERICAL SOLUTION OF A NONLINEAR DIFFERENTIAL EQUATION RESULTING FROM AN EXTENSION OF NEETESON'S EQUATIONS ON FERRITE CORES,
by Martin Blumberg. Feb 63, 1v. 8 44 63 2
Contract AF33 657 8777

Unclassified report

Descriptors: *Magnetic cores, Differential equations, Hysteresis, Switching circuits.

Starting from Neeteson's approximation for the flux switching characteristic of a magnetic core, the differential equation describing the case when such a core is terminated in series inductance and resistance was derived. By means of successive transformations, the equation was reduced to a form which could be solved by an iterative procedure. A family of solutions was computed and plotted. To date, no attempt has been made to check these curves against experimental results, although verification is planned for the future. Since Neeteson's approximation is admittedly a compromise between exact fit to the flux characteristic and mathematical simplicity, only a fair agreement is to be expected. It is believed that the differential equation and solutions are applicable to flux steering through multipath magnetic structures. The mathematical methods employed are themselves of some interest. (Author)

AD-403 334 Div. 15
(TISTP/FEM) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON RANDOM WALKS WITH A REFLECTING BARRIER,
by Sidney C. Port. May 63, 20p. RM3597PR
Contract AF49 638 700

Unclassified report

Descriptors: *Probability, *Numerical methods and procedures, Integral equations, Functions, Numbers, Statistical functions, Statistical distributions.

Results are presented concerning a random walk closely related to the much-studied sum of independent random variables, but differing from this sum in that the present walk is not permitted to become negative. (Author)

AD-403 426 Div. 15
(TISTP/GRW) OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
ON THE APPROXIMATE SOLUTION OF INTEGRAL EQUATIONS OF THE CONVOLUTION TYPE.
Final rept., 1 Jan-31 Dec 61,
by Yudell L. Luke. Feb 63, 23p.
Contract AF33 616 7062, Proj. 7071, Task 7071 02
ARL 63 33

Unclassified report

Descriptors: *Integral transforms, *Numerical analysis, Integral equation , Special functions (Mathematical), Tables.

Convolution integral equations have a simple representation in the form of a Laplace transform, and so solution follows by transform inversion. Usually, the solution is expressed as an infinite integral which can only be evaluated by numerical integration. Often, the transform involves the ratio of functions of

hypergeometric type. Approximations to an inverse Laplace transform are studied when the transform, which involves the exponential integral, is approximated by rational functions. The approximate solution is a sum of exponential functions, and numerics are presented to show the efficiency of our technique. (Author)

AD-403 490 Div. 15
(TISTP/FEM) OTS price $9.60

Kansas U., Lawrence.
ON SPACES OF POTENTIALS CONNECTED WITH Lp CLASSES,
by N. Aronszajn, F. Mulla, and P. Szeptycki.
1963, 110p. TR28
Contract Nonr58304
Unclassified report

Descriptors: *Bessel functions, *Functional analysis, Functions, Integral transforms, Integral equations, Inequalities, Transformations (Mathematics), Sequences.

16. MEDICAL SCIENCES

AD-402 620 Div. 16
(TISTB/AW) OTS price $4.60

Aerospace Information Div., Washington, D. C.
SOVIET BIOMEDICAL MONITORING IN SPACE FLIGHT METHODS, TECHNIQUES, AND EQUIPMENT. COLLECTION OF ABSTRACTS.
27 Mar 63, 36p. P63 42
Unclassified report

Descriptors: *Space medicine, Physiology, Electrocardiography, Ballistocardiography, Weightlessness, Electroencephalography, Space flight, Astronauts, Blood circulation, Instrumentation.

Contents:
Methods and techniques of biomedical monitoring
Method of fixing EKG electrodes
Devices for attachment of biosensors
Physiological responses of cosmonauts in flight
Results of postflight medical examination of Titov
Method of measuring intracranial circulation
Registration of seismocardiograms in dogs
Integrated phonocardiography
Registration of sphygmograms in dogs
Life support system for mice
Containers for bioobjects in space flight

AD-402 671 Div. 16
(TISTB/AW) OTS price $.50

Naval Research Lab., Washington, D. C.
STRUCTURE AND SURFACE PROPERTIES OF PROTEIN MONOLAYERS,
by J. D. Bultman and J. M. Leonard. 2 Apr 63, 12p. NRL 5910
Unclassified report

Descriptors: *Proteins, *Monomolecular films, Molecular structure, Molecular properties, Surface properties, Cells (Biology).

The role played by monomolecular films of proteins and other biological materials in supporting the metabolic functions of a living cell has become more fully recognized in recent years. Thus the relevance of a study of films of these materials in the laboratory in an effort to determine their method of formation, nature, and mode of action within the cell becomes obvious. As a brief introduction to this area of research a general review relating to the surface properties of proteins is presented. This includes discussion of the structure of protein molecules surface denaturation and associated entropy changes, the formation and physical characteristics of protein films, the mechanisms associated with film compression, and the intramolecular and intermolecular forces of attraction and repulsion existing within the films. (Author)

AD-402 712 Div. 16
(TISTM/TCG) OTS price $.50

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Progress rept., 1 Feb-30 Apr 63,
by Stephen Ginocchio and Harbans Lal. 30 Apr 63, 14p. ARF C222 4
Contract DA49 193md2281
Unclassified report

Descriptors: *Culicidae, *Insect repellents, *Mouth, *Organic compounds, Lipids, Water, Solubility, Biological assay, Synthesis (Chemistry), Insecticides, Chemical compounds, Medicine, Pharmacology.

Contents:
Determination of lipid-water partition of potential repellents
Distribution of potential mosquito repellents between chloroform and water
Synthesis of N,N-diethyl-2,6-dimethylbenzamide and N,N-diethyl-m-(n-propyl)benzamide
In vitro assay procedure: Baudruche- and Fourex-treated membranes

AD-402 736 Div. 16, 20
(TISTM/WA) OTS price $6.60

Naval Radiological Defense Lab., San Francisco, Calif.
AN INDEX TO U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY TECHNICAL REPORTS (TR SERIES), ISSUED FROM 1 JULY 1961 THROUGH 31 DECEMBER 1962,
comp. by Elizabeth Budd, 11 Mar 63, 68p. 477
Unclassified report

Descriptors: *Bibliography, *Health physics, Index, Abstracts, Nuclear physics, Radiobiology.

AD-402 754 Div. 16
(TISTM/AAR) OTS price $1.10

Oregon U., Eugene.
INVESTIGATION OF THE POSSIBLE UTILITY OF MERISTIC CHARACTERS OF FISHES AS INDICATORS OF COASTAL CIRCULATION.
Final rept.
1963, 2p.
Contract Nonr2762 00, Proj. NR104 386
Unclassified report

Descriptors: *Fishes, *Spinal column, Measurements.

Meristic characters of fishes, e.g. numbers of vertebrae, fin spines, and fin rays give a good account of the thermal history during early development. Preliminary studies indicated that

by intensive sampling of populations of juveniles of certain species as they arrived from their larval tour in the plankton, a good assessment could be made of the direction this larval tour had taken. (Author)

AD-402 758 Div. 16
(TISTM/AAR) OTS price $1.00

Pierce, John B., Foundation of Connecticut, New Haven.
HYPOTHALAMIC TEMPERATURES IN DOG AND MONKEY AND THERMOREGULATORY RESPONSES TO ENVIRONMENTAL FACTORS.
Final rept. Oct 61-Nov 62,
by Harold T. Hammel, Donald C. Jackson, Johannes A. J. Stolwijk and James D. Hardy. Jan 63, 30p.
Contract AF33 657 7603, Proj. 7222, Task 722204
AMRL TDR63 5
Unclassified report

Report on ''Biophysics of Flight''.

Descriptors: *Skin, *Thalamus, Dogs, Primates, Physiology, Thermal stresses, Temperature control, Temperature.

The role of the hypothalamic and skin temperatures in controlling the thermal response of a resting animal was studied by measurements of (1) hypothalamic, rectal, ear skin and trunk skin temperatures on the resting dog and rhesus monkey (hypothalamic temperature only) in hot, neutral and cold environments; and (2) the thermal and metabolic responses of a dog while holding hypothalamus at approximately 38.7 C by means of six thermodes surrounding the hypothalamus and perfused with water. The results indicate that the parameters involved in temperature regulation must include more than skin and hypothalamic temperatures since an animal engaged in normal regulation would exhibit very different responses for the same hypothalamic temperature when exposed to different ambient temperatures or would exhibit the same responses at widely different hypothalamic temperatures at different times, depending on whether asleep or awake. (Author)

AD-402 759 Div. 16
(TISTM/WA) CTS price $.75

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
GASEOUS EXCHANGE IN A CLOSED ECOLOGICAL SYSTEM.
Final rept., Apr 61-June 62,
by Sheldon A. London and Arselus West.
Dec 62, 19p.
Proj. 7164, Task 716403
AMRL TDR62 139 Unclassified report

Report on Space Biology Research.

Descriptors: *Closed-cycle ecological systems, *Algae, Carbon dioxide, Oxygen, Rats, Fungi, Sewage, Gas analysis, Spacecraft cabins.

A series of experiments was performed to determine the feasibility of using several types of organisms to maintain a gaseous balance in a closed system. The system consisted of: (a) a photosynthetic unit comprised of cells of Chlorella pyrenoidosa strain TX 71105, (b) a biological aerobic sewage-digesting unit, (c) a unit containing an ammonia-utilizing fungus, Linderina pennispora, and (d) an animal chamber containing a white adult male rat. Although many difficulties were encountered, this bioregenerating unit could be operated under closed conditions for 390 hours. Gas analyses indicated CO2 and O2 levels can be maintained at desirable levels. Material balance within the system was not attempted. However, nitrogen analysis of the resultant fungal mass showed that data on the basic physiology of the organism is required before such a balance can seriously be attempted. The relationship between mission requirements and the level of biological complexity of a closed ecological system was discussed. (Author)

AD-402 762 Div. 16, 30
(TISTM/PCR) OTS price $.50

St. Louis U. School of Medicine, Mo.
CONTINUOUS SIMULTANEOUS REGISTRATION OF SWEATING AND BLOOD FLOW IN A SMALL SKIN AREA.
Final rept., Nov 61-Nov 62,
by Alrick B. Hertzman and Franz Flath. Feb 63, 9p.
Contract AF33 616 7077 and Grant H4939, Proj. 7222, Task 722204
AMRL TDR63 16 Unclassified report

Report on Biophysics of Flight.

Descriptors: *Blood circulation, *Perspiration, Skin, Instrumentation, Calibration, Design, Thermal stresses, Evaporation, Heat, Measurement.

A capsular method for recording evaporation from a small skin area (5, 10, or more sq cm), continuously, quantitatively and with a very fast response time as brief as 0.15 sec is presented. Water of diffusion at rates of 0.005 mgm/sq cm/min. or high sweating rates were measured with equal ease. The method is combined with photoelectric recording of the skin pulses to provide precise temporal relations of cutaneous vascular events and of sweating in the same segment of skin. Cycles of sweating in forearm skin occurred synchronously with digital vasoconstrictions but were not accompanied by changes in the rate of blood flow in forearm skin although venoconstriction in the forearm often took place with an increase in sweating. The observation contradicted the concept of bradykinin as an important vasodilator in accounting for cutaneous vasodilatation during heat stress. (Author)

AD-402 794 Div. 16, 32
(TISTM/WA) OTS price $16.00

Maryland U., College Park.
INDEX CATALOGUE TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY. VOLUME I. DIPTERA.
1963, 243p.
Contract DA49 193md2238
Unclassified report

Descriptors: *Bibliography, *Diptera, Disease, Disease vectors, Ecology, Culicidae, Catalog.

AD-402 870 Div. 16
(TISTB/AW) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATIONS OF THE CHEMICAL COMPOSITION AND MOLECULAR ORGANIZATION OF NERVE AXONS.
Report for 1 May 62-30 Apr 63,
by Francis O. Schmitt. 29 Apr 63, 11p.
Contract Nonr1841 27, Proj. NR101 100
Unclassified report

Descriptors: *Nerve cells, *Neuromuscular transmission, Proteins, Stability, X-ray diffraction analysis, Separation, Cells (Biology), Molecular structure, Cephalopoda.

Physicochemical and analytical studies of the fibrous protein and other constituents of the axoplasm of the giant fibers of the large squid Dosidicus gigas were made. Axon material was dissected from a large number of squid and stockpiled for future analysis. Initial experiments were made in an investigation of the possible function of the fibrous protein which is ubiquitous to all neurons. Consideration was given to the possible role of neuronal macromolecules in encoding experimental information in long-term memory and learning. (Author)

AD-402 905 Div. 16
(TISTM/AAR) OTS price $.75

Pittsburgh U., Pa.
THERMAL STRESS ON CELLULAR STRUCTURE AND FUNCTION.
Final rept.
by Ralph Buchsbaum. Feb 63, 17p.
Contract AF33 616 8093, Proj. 7222, Task 722204
AMRL TDR63 14
Unclassified report

Report on Biophysics of Flight.

Descriptors: *Kidneys, *Tissue cultures, Mice, Physiology, Temperature, Morphology, Cells, Thermal stresses.

Mouse kidney cells were grown on coverslips in a specially designed perfusion chamber which permitted continuous change of medium, microscopic examination and photography, and precise temperature measurement and control. Cells were exposed to normal body temperature for a time and then to an elevated temperature for a period of one to ten minutes. The temperature then was returned to normal. Observation of the cells revealed a standard pattern of response. Cells appear generally normal up to 42 C. Studies were made at 47, 50, 53, and 56 C. The time to reach any stage of damage is a factor of about 4.5 for each 3 C increase in heat-shock. The duration of exposure to elevated temperature was found not to be as important as the maximum temperature reached. A series of curves showing the distribution of cells in various stages of cell damage with temperature is presented. (Author)

AD-402 913 Div. 16
(TISTB/AW) OTS price $.75

Biotechnology Lab., U. of Calif., Los Angeles.
MEASURING PERFORMANCE CHANGES IN HIGHLY TRANSIENT EXTREME HEAT STRESS: RATIONALE, PROBLEM, AND EXPERIMENTAL PROCEDURES.
Technical rept. July 61-July 62,
by Hilde Groth and John Lyman. Jan 63, 22p.
Contract AF33 616 6763, Proj. 7222, Task 722204
AMRL TDR63 1
Unclassified report

Report on Biophysics of Flight.

Descriptors: *Stress (Physiology), *Heat tolerance, Test methods, Performance tests, Pain, Thresholds (Physiology), Anxiety, Fear Stress (Psychology), Man, Measurement.

A review of the existing state of the art for handling human performance under transient heat stress is presented. It was concluded that it would be necessary to develop a new methodology based on 'micro-performance' measurements to assess severe localized transient heat stresses as relevant to contemporary flight problems. The test procedure proposed is based on the rationale that a primary task with difficulty that can be varied according to subject error in order to maintain a relatively constant subject performance level can be used as a measure of the moment-to-moment perceptual load. In addition to the primary task, secondary tasks have been suggested to help simulate problems in decision-making and verbal communication. (Author)

AD-402 923 Div. 16
(TISTM/PCR) OTS price $8.60

Seato Medical Research Lab., San Francisco, Calif.
SEATO MEDICAL RESEARCH PROJECT.
Quarterly Research progress rept., 1 Jan-31 Mar 63.
22 Apr 63, 89p.
Unclassified report

Descriptors: *Communicable diseases, *Arthropods, Gastrointestinal system, Escherichia, Viruses, Encephalitis viruses, Culicidae, Diptera, Mites, Ticks, Insecticides, Tolerances (Physiology), Hemosporidia, Diseases, Fishes, Animals, Gastropoda, Veterinary medicine, Ecology, Tissue culture, Disease vectors.

Research projects at the SEATO Medical Research Laboratory are summarized. The primary emphasis of the projects is the arthropod-borne diseases of Thailand. Specific projects are concerned with: acute gastroenteritis, enteric infections, arthropod infections, rickettsial diseases, insecticide tolerance of mosquitoes, zoonotic diseases, veterinary medicine, and ecology and control of disease vectors and reservoirs.

AD-402 961 Div. 16
(TISTM/CCH) OTS price $3.60

Keio U. School of Medicine, Tokyo (Japan).
RELATION BETWEEN THE ELECTRORETINOGRAM (ERG) AND SINGLE CELL ACTIVITIES IN THE RETINA.
by Tsuneo Tomita. 22 Feb 63, 27p.
Grant DA CRD AG S92 544 62 G2
Unclassified report

Descriptors: *Retina, *Electrodes, *Electrolytes (Physiology), Vision, Eye, Electronic equipment, Ganglia, Identification, Instrumentation, Amphibians, Oscilloscopes, Cells (Biology).

Attempt at identifying the cell types that make sources of the ERG components is continued. Of the three groups of responses recorded from single units in the frog's retina, only the Group-II responses were left suspected to be constituents of the ERG, but the present work excludes this possibility, since it is probable that the responses in question arise from the soma and/or dendrites of ganglion cells that contribute little to the ERG. The failure to record any constituents of the ERG in the frog led research in two directions. One is the effort to make intracellular recording possible from cell types other than those already studied. A technique of ''harpooning'' single cells with pipets at high momentary acceleration is being tested and will make a subject in the coming year. The other is to apply the conventional technique to materials other than the frog and see if the

localization of ERG constituents is possible in these materials. Among several animals examined, the carp is subject to a more thorough test. Studied are properties of Group-III responses (S-potentials), and the spatial distribution of ERG components in the focal and non-focal regions of the retina. (Author)

AD-402 969 Div. 16
(TISTM/PCR) OTS price $.75

Kanazawa U. Medical School, Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Final rept. 15 Jan 62-14 Jan 63,
by Yasuyuki Takagi. 14 Jan 63, 23p. 2
Contract DA92 557FEC34525
Unclassified report

Descriptors: *Desoxyribonucleic acids, Synthesis (Chemistry), Distillation, Tritiated compounds, Escherichia, Starvation, Chromosomes, Genetics, Dynamics, Tables, Metabolism.

The purpose of this investigation is to clarify the real biochemical mechanism of DNA formation involved in cell division on the basis of enzyme-chemical studies on DNA polymerase. Main efforts were made to analyze the mode of action of mitomycin C on DNA polymerization reaction in Escherichia coli, since this compound exhibits the primary inhibitory action on this step in the DNA formation system. However the experiments with cell-free extract indicated that the polymerase itself is not interfered with by the presence of the antibiotic, nor MC causes any damage or alternation in the DNA molecule in the cells resulting in the loss of its activity as primer in polymerization reaction. While MC exerts inhibitory action on hereafter DNA formation of the cells, even when exposed to the antibiotic during the period that the DNA replication is completely blocked by the lack of a precursor. Thus, it was suggested that the regulatory mechanism to initiate the DNA synthesis is actually operating in the cells and may be susceptible to the action of MC. (Author)

AD-402 971 Div. 16
(TISTM/WA) OTS price $.75

Jikei U., School of Medicine, Tokyo (Japan).
STUDIES ON THE MECHANISM OF CELL DAMAGE IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Final rept. 15 Nov 61-14 Nov 62,
by Fumikazu Takaki. 14 Nov 62, 16p. 2
Unclassified report

Descriptors: *Cells (Biology), *Kidney, *Liver, *Heart, Pathology, Electron microscopy, Microsomes, Cytochemistry, Rats, Toxicity, Drugs, Poisoning.

Thioacetamide and yellow phosphorus were respectively administered into the stomach of Wister rats and periodical changes (15 min. - 48 days) occurring in liver cells were observed with light and electron microscopes. In the initial stage of acute thioacetamide poisoning, liver cell injury appeared in the central zone and then spreads to the periphery. Electron microscopy revealed (a) transitional figures from REr to SEr, (b) single limiting membrane of mitochondria and increased electron density, (c) decreased glycogen content, (d) enlargement of nucleoli, and (e) decrease or complete disappearance of Palade's granules, etc. These findings appeared from about 30 minutes and become prominent with the lapse of time. In the initial stage of acute yellow phosphorus poisoning, liver injury appeared in the peripheral zone. Electron microscopically the main changes consisted of (a) transitional figures between REr to SEr, (b) swelling of mitochondria, (c) decrease of glycogen, (d) appearance of lipid droplets, (e) enlargement of nucleoli, (f) decrease and disappearance of Palade's granules, etc. These figures were first encountered at 15 minutes, and they became prominent with the lapse of time. (Author)

AD-403 108 Div. 16
(TISTM/PCR) OTS price $1.60

Jikei U. School of Medicine, Tokyo (Japan).
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
Final rept. no. 1, 20 Jan 62-19 Jan 63,
by Isamu Kondo. 19 Jan 63, 7p.
Contract DA92 557FEC35778
Unclassified report

Descriptors: *Genetics, *Microorganisms, *Bacteriophages, *Desoxyribonucleic acids, Glucose, Nucleic acids, Monosaccharides, Salmonella, Antigens and antibodies, Sedimentation.

Phage a sub 1 cultured by Sg is typically controlled by this host and variated to be unable to produce plaque on S4S in such good efficiency as when plated on Sg. This restricted phage a sub 1 (Sg) can adsorb on S4S and inject its DNA into the interior of S4S cell. Glucose and mannose can specifically inactivate the purified a sub 1 phage particles. These monosaccharides are also two of four terminal component sugars of salmonella antigen O(12) which is the receptor for this phage. Methods of extraction and purification of a sub 1 phage DNA have been greatly improved by using the synthetic medium devised for Sg and the refrigerated centrifuge supplied under this contract. With this newly obtained sample the sedimentation rate of a sub 1 phage DNA could be calculated 9.7 x 10 to the -13th power. Mixinfection of this sample of a sub 1 DNA and the active a sub 10s phage particles belonging to the different serological type could also yield some new type phages corresponding to th. recombinat, if any, between a sub 1 and a sub 10s, one of which was very different from those previously obtained. (Author)

AD-403 109 Div. 16, 20
(TISTM/WA) OTS price $1.60

Hokkaido U. (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Final rept. no. 2, 15 Dec 61-14 Dec 62,
by Sajiro Makino. 14 Dec 62, 12p.
Contract DA92 557FEC34462
Unclassified report

Descriptors: *Radiation effects, *X rays, *Chromosomes, *Mitosis, Beta particles, Orthoptera, Tissue culture, Genetics, Drosophila, Paramecium, Man, Insects, Radioprotective agents, Antigen-antibody reactions, Mice, Reproductive system.

Effects of radiations on cell division and chromosomes in animals were studied from various stand points. X- and beta-irradiations on grasshopper spermatocytes were investigated using various chemicals with special regards to the radioprotection. The effects of single or repeated X-irradiation on chromosomes of human in

vitro cell line were studied. Genetic studies of anomalies in the mouse populations whose ancestors have received X-irradiation were investigated. Effects of X-rays on the spermatogenesis of Drosophila were studied and the effects of gamma-irradiation on mating type of Paramecium were studied using P. polycarium which has the binary mating type. Many new clones were obtained by the application of gamma-irradiation. These clones were very useful to analyse the genetic behaviour of Paramecia and further studies are in progress. Immunological response of lethally irradiated mice which receive injection of heterologous spleen cells was studied. Histological observations on spleens were carried out as a supplemental experiment. The effects of X-irradiation on the pregnancy rate in mice received polyovulation treatment were investigated. The implantation of hormone-induced polyovulated eggs, 25 X-irradiation is effective. (Author)

AD-403 110 Div. 16
(TISTM/CCH) OTS price $4.60

Chiba U. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
Final rept., 1 Mar 62-28 Feb 63,
by Muneo Yokogawa. 28 Feb 63, 43p.
Contract DA92 557FEC35859
Unclassified report

Descriptors: *Infections, *Parasites, Antibiotics, Immunology, Therapy, Diagnosis, Platyhelminths.

Immunological diagnosis as a screening method for paragonimiasis was made; 115,866 individuals were examined intradermal test with V.B.S. Antigen in Japan during 1954 - 1961. Stool examinations and complement-fixation tests were performed on positive and doubtful skin reactors. Paragonimus eggs were found in the stools of positive skin reactors, but not in those of negative reactors. It was found that the intradermal test was specific for paragonimiasis. Positive skin reactors were included of present and past infections, and were not always shown the present status of lung fluke infections. Chemotherapy of paragonimiasis with Bithionol, in which studies on the minimum effective dose of Bithionol and changes of abnormal shadows in chest X-ray examinations after treatment with Bithionol, were made. Eighty cases of paragonimiasis were treated with daily dose 20mg/kg - 50mg/kg of Bitin (Bithionol) every other day for 5 - 15 times and completed the follow-up observations for 1 year after the treatments. Seventy-eight out of 80 cases were cured completely. Among 129 abnormal shadows found in 78 cases before treatment, 20.9% of them were absorbed immediately after completion of treatment and most of them were absorbed during the period from 1 - 3 months after treatment. The minimum effective dose of Bitin was daily dose 30mg/kg every other day for 10 times and the chest X-ray examinations after the treatments have practical values.

AD-403 118 Div. 16
(TISTM/CCH) OTS price $8.60

Nagasaki U. (Japan).
ON THE ROLE OF THALAMIC AND RETICULAR FORMATION UPON THE FREQUENCY RESPONSE ACTIVITIES OF THE GENERATOR OF ELECTROENCEPHALOGRAM AND MYOTONOGRAM.
Final rept. no. 1, 1 Jan-31 Dec 62,
by Kensuke Sato. 31 Dec 62, 89p.
Contract DA92 557FEC35764
Unclassified report

Descriptors: *Electroencephalography, *Vision, *Brain, *Thalamus, Frequency, Theory, Measurement, Cerebral cortex, Sensory mechanism, Reaction (Psychology), Medical equipment, Recording systems, Stimulation.

Theoretical and experimental studies on the activities of nonspecific and specific projection systems hidden in the electroencephalogram were conducted from the standpoint of the random process in a stochastic servosystem. It was verified that EEG activity (frequency response) is not only equivalent to the excitability cycle of an excitable system, but to an extension of the spectral sensitivity curve of the visual system and response area of the auditory system. Cerebral EEG activities were elicited by centromedian and midbrain reticular stimulation of low frequency. A high frequency reticular stimulation, by which electrocortical arousal was induced in EEG, followed an inhibitory and augmentative processes to reduce and enhance respectively the flicker activity of low frequency. It was inferred from the above theoretical and experimental results that servomechanic roles of nonspecific and specific projection systems are capable of observing in the EEG activities. On the same roles in the descending reticular system, some theoretical and experimental evidences were demonstrated in the myotonographic (MT) activity. (Author)

AD-403 119 Div. 16
(TISTM/CCH) OTS price $4.60

Tokyo Municipal Tamagama Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Final rept. no. 2, 1 Feb 62-31 Jan 63,
by Kazumine Kobari. 31 Jan 63, 1v.
Contract DA92 557FEC34616
Unclassified report

Descriptors: *Infections, *Intestine, *Pathology, Diagnosis, Shigella, Salmonella, Vibrio, Classification, Histology.

Among the studies of the intestinal infections, none is poorly understood as their pathogenesis. In order to clarify the problem, the comparative studies of infections due to different kinds of causative organisms were carried out, by using the observations of patients in the outbreak due to shigella, salmonella and cholera vibrio. Signoidoscopic examinations and biopsy studies show there may be a certain threshold in the pathological lesions of intestinal mucuous membrane, to show typical symptoms which are specific for the infection. Characteristic clinical symptoms may be not revealed, until lesion exceeded the threshold. On the other hand, there may be included frequently patients of different kinds of infection, who showed similar or common symptoms. There should be a distinct difference between them in the pathological lesions on the intestinal mucosa. (Author)

AD-403 270 Div. 16
(TISTM/CCH) OTS price $1.10

Bernice P. Bishop Meseum, Honolulu, Hawaii.
POTENTIAL VECTORS AND RESERVOIRS OF DISEASE IN NEW GUINEA AND SOUTH ASIA.
Annual progress rept., Apr 62-Mar 63,
by J. L. Gressitt. Mar 63, 5p.
Grant DA MD49 193 62 G65
Unclassified report

Descriptors: *Disease vectors, *Arthropods, *Animals, Ecology, Medical research, Parasites.

The primary objective was to collect arthropods, particularly those of medical importance. Special emphasis was placed on collection of ectoparasites from vertebrate hosts. An estimated total of 760,000 specimens of arthropods including about 285,000 ectoparasites taken from 10,400 vertebrates were collected, partly in conjunction with other projects supported by the U. S. Army Medical Research and Development Command and National Institutes of Health. These are being processed in Honolulu, Malaya, Taiwan and Japan in order to make them available early for study by collaborating specialists. (Author)

AD-403 271 Div. 16
(TISTM/AAR) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
MUTUALLY TOLERANT HOST AND DONOR TYPE IMMUNOLOGICALLY COMPETENT CELLS IN MOUSE RADIATION CHIMERAS,
by W. E. Davis, Jr., M. L. Tyan, and L. J. Cole.
19 Mar 63, 22p. NRDL TR630
Unclassified report

Descriptors: *Cells, *Tissues, Immunology, Mice, Hemopoietic system, X-rays, Radiation effects, Transplantation.

Host type immunologically competent cells were found in 4 out of 15 LAF1 (host)-C3H (donor) long-lived radiation mouse chimeras. Three of these 4 chimeras also had donor type lymphoid cells. Therefore, the host and donor immunocompetent cells must have co-existed in a state of mutual homograft tolerance. Of the remaining 11 chimeras tested, 6 did not exhibit host type immunocompetent cells, while 5 showed questionable host-derived immunological activity. Donor immunocompetent cells were detected in a total of 4 of the 15 LAF1-C3H chimeras. Host type (i.e., strain A) immunocompetent cells were detected also in two A-LAF1 radiation chimeras. On the other hand, 10 C3HD2F1 radiation chimeras apparently did not contain host-derived immunogenic cells. (Author)

AD-403 274 Div. 16
(TISTM/AAR) OTS price $1.10

Pasadena Foundation for Medical Research, Calif.
RADIOPROTECTIVE AGENTS. A CORRELATIVE STUDY OF RNA CONTENT AND THE DEGREE OF RADIORESISTANCE OF CELLS IN VITRO,
by Donald E. Rounds and William C. Slick. Mar 63, 5p.
Contract AF41 657 337, Task 775702
SAM TDR63 17
Unclassified report

Descriptors: *Ribonucleic acids, *Cells, Gamma radiation, Nucleic acid, Synthesis, Ribonuclease, Radioprotective agents, Yeasts.

In vitro studies revealed that a 24-hour preirradiation treatment of an amnion cell line with yeast RNA increased cell survival in proportion to the yeast RNA content in the medium. Conversely, ribonuclease treatment increased radiosensitivity. However, the protective response was observed only after 8 to 10 hours of preirradiation treatment with yeast RNA. Some increase in cell survival was recorded at 4 to 6 hours when an alkaline hydrolysate of yeast RNA was used. Microspectrophotometric measurements of cytoplasmic basophilia revealed substantially increased optical density within 4 hours of incubation with RNA. The delay in a protective response during this period may have been due to the time required for digestion and resynthesis into an active radioprotective agent. A correlation between RNA synthesis and the radioprotective response confirmed this hypothesis. (Author)

AD-403 275 Div. 16, 28
(TISTB/AW) OTS price $2.60

Pasadena Foundation for Medical Research, Calif.
A TEST FOR SPEECH DISCRIMINATION COMPOSED OF CNC MONOSYLLABIC WORDS (N. U. AUDITORY TEST NO. 4),
by Tom W. Tillman, Raymond Carhart, and Laura Wilber. Jan 63, 22p.
Contract AF41 657 418, Proj. 7755, Task 59670
SAM TDR62 135
Unclassified report

Descriptors: *Speech recognition, *Audiometry, *Hearing, Intelligibility, Diagnosis, Test methods, Tests.

The N. U. Auditory Test No. 4 is composed of two lists of 50 CNC monosyllabic words each that conform to the phonemic balance advocated by Lehiste and Peterson. The lists were given twice to three different groups of 16 subjects -- those with normal hearing, those with conductive losses, and those with sensorineural losses. During each test, six presentation levels of ascending intensities were used, the total range being from -4 db to +40 db sensation level. The three types of subjects evidenced articulation functions of the same shape, but the functions for sensorineurals were of gentler slope than for the other two groups. The discrimination scores for list I were slightly higher than for list II. During the retest, the discrimination scores improved slightly. Scores between lists as well as those from test to retest showed relatively high positive correlation. Therefore, the N. U. Auditory Test No. 4 seems to be a valuable tool for the measurement of phonemic discrimination. (Author)

AD-403 380 Div. 16
(TISTM/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CORTICOSTEROIDS IN HUMAN PAROTID FLUID FOLLOWING ORAL HYDROCORTISONE DOSAGE,
by Ira L. Shannon and Fred H. Katz. Apr 63, 3p.
Task 775602
SAM TDR63 12
Unclassified report

Descriptors: *Dentistry, *Saliva, *Corticosteroid agents, Man.

A single 20-minute parotid fluid sample was collected prior to, and six 20-minute samples were collected subsequent to the oral administration of 50-milligrams of hydrocortisone to 30 healthy young adult males. Blood was drawn before dosage and 2 hours thereafter. The following conclusions were drawn: The serum free 17-OHCS increase after dosage was highly significant. Hydrocortisone did not exert a significant effect on parotid fluid flow rate. A highly significant increase in parotid fluid free 17-OHCS levels was found in the 40- to 60-minute sample. A significant response was elicited in all subjects within 2 hours. (Author)

Division 16 - MEDICAL SCIENCES

AD-403 401 Div. 16, 1, 23
(TISTA/LSK) OTS price $3.60

Bell Helicopter Co., Fort Worth, Tex.
A STUDY TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED,
by Lowell E. Wilkerson. 15 Dec 58, 35p.
D228 420 004
Contract Nonr167000
Unclassified report

Descriptors: *Helicopters, *Pilots, *Perception, Psychometrics, Velocity, Control, Sensitivity, Statistical analysis, Flight instruments, Flight simulators, Motion, Performance tests, Positioning reactions.

The Army-Navy Instrumentation Program has spotlighted the need for more information of the judgment and control of rates. The embryo helicopter pilot must learn to judge and control several rates of movement before he is able to accomplish the one task of hovering. Little is known of how well rates can be judged and controlled when encoding rate through the use of some symbol or index. Assuming they are judged and controlled within acceptable limits, how should this information be encoded. Sixteen flight-naive and eight flight-experienced people were used as subjects. They were presented two symbols, a line and a circle which either expanded or contracted. Each subject was given eight trials in each of the four conditions. Th analysis of the data revealed that each of the groups tested made smaller final rate and final position errors when using the contracting circle. (Author)

AD-403 402 Div. 16
(TISTM/CCH) OTS price $3.60

Biotechnology Lab., U. of Calif., Los Angele
UPPER EXTREMITY PROSTHETICS RESEARCH. HUMAN TRACKING. SENSORY-MOTOR CONTROL.
Progress rept.
15 Mar 63, 27p. 63 17
Contracts V1005M2075, N123 60530 23558, and Grant OVR RD1201M63
Unclassified report

Descriptors: *Prosthetics, *Tracking, *Motor reactions, Control, Errors, Pneumatic systems, Arms, Performance tests, Tracking telescopes.

Contents: Upper extremity prosthetics research; Fundamental studies to establish body control sites for application to externally-powered prostheses, Component development studies, Control engineering survey, Analysis of existing externally-powered prostheses and development of advanced design specifications, Development of electro-pneumatic lock-and-lift system. Research on the performance of human operators of tracking systems; Performance evaluation of variables of the optical system on the NOTS tracking simulator, Multiman tracking studies, Literature review: an integration of various areas of visual perception applicable to target acquisition and tracking problems, Research on sensory-motor control.

AD-403 481 Div. 16
(TISTM/CCH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A DIGITAL READOUT TECHNIC APPLICABLE TO LABORATORY AND AEROSPACE MEDICAL MONITORING OF PHYSIOLOGIC DATA.
Feb 63, 14p.
Task 793002
SAM TDR62139 Unclassified report

Descriptors: *Medical equipment, *Space medicine, *Monitors, Respiration, Blood pressure, Heart, Blood volume, Telemeter systems, Digital computers, Instrumentation.

This report describes a technic for digital readout of systolic and diastolic blood pressure, heart rate, and respiratory minute volume, applicable to wire telemetry in the laboratory as well as wireless telemetry from aerospace vehicles. General description of the technic and specific construction details are given. (Author)

17. METALLURGY

AD-402 580 Div. 17, 14
(TISTM/AM) OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SINTERED CORUNDUM (Spechennyy Korund),
by N. M. Pavlushkin. 18 Apr 63, 300p.
FTD TT62 912

Unclassified report

Descriptors: *Textbooks, *Sintering, *Corundum, Aluminum compounds, Oxides, Sapphires, Crystal lattices, Mechanical properties, Abrasives, Clay minerals, Refractory materials, Grinders, Grinding wheels, Industrial equipment, Particle size, Recrystallization, Additives, Microstructures, Group I elements, Group II elements, Group III elements.

This book gives an account of the part played by synthetic sintered corundum in various branches of engineering. The properties and methods of preparing sintered corundum are described, and its fields of application are considered in detail. The book is intended for engineering-technical and scientific workers involved in the production and utilization of sintered corundum in engineering. (Author)

AD-402 600 Div. 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STUDYING THE HARDNESS OF TUNGSTEN AT TEMPERATURE RANGES OF FROM 20-2700 DEGREES,
by G. S. Pisarenko and V. O. Borisenko. 3 Apr 63, 7p.
FTD TT63 101

Unclassified report

Trans. from Ukrainian Periodical, Dopovidi Akademii Nauk Ukrains'koi RSR, no. 8, pp. 1053-1056, 1962.

Descriptors: *Tungsten, High temperature research, Determination, Test methods, Deformation, Plasticity, Measurement, Hardness.

AD-402 619 Div. 17
(TISTM/BRW) OTS price $7.60

Denver Research Inst., Colo.
A FUNDAMENTAL INVESTIGATION OF THE ALLOYING BEHAVIOR OF THE RARE EARTHS AND RELATED METALS.
Final technical rept. for 1 Nov 59-31 Oct 62,
by J. F. Nachman, C. E. Lundin, and A. S. Yamamoto. Jan 63, 67p.
Contract AF33 616 6787, Proj. 7021
ARL 63-15

Unclassified report

Descriptors: *Rare earth elements, Neodymium, Praseodymium, Samarium, Vapor pressure, Measurement, Phase studies, X-ray diffraction analysis, Density, Hardness, Crystal structure, Melting, Freezing, Transition temperature, Crystal lattices, Heat of sublimation, Alloys.

The vapor pressures of praseodymium, neodymium, and samarium were measured with a Knudsen effusion apparatus. Also, using the same apparatus, thermodynamic activities of the liquid phase of the praseodymium-neodymium system were determined. Heats of vaporization were established from the vapor pressure data for praseodymium, neodymium, and samarium. The phase diagram for the praseodymium-neodymium system was determined from thermal analyses, metallographic examinations, and X-ray diffraction studies. Results of the thermodynamic activity studies and measurements of solid (room-temperature) and liquid densities indicate ideal behavior in both liquid and solid solutions, within the experimental error. Ideal behavior was predicted for the praseodymium-neodymium system, as there are essentially no differences between the component elements in considering such variables as electronic structure, crystal structure, atomic diameter, valency effect, electronegativity, and electron concentration. (Author)

AD-402 630 Div. 17
(TISTM/BRW) OTS price $1.10

Nuclear Metals, Inc., Concord, Mass.
REFRACTORY METALS PHASE DIAGRAMS.
Quarterly progress rept., 1 Oct-31 Dec 62,
by E. J. Rapperport. 8 Feb 63, 7p. NMI 9249
Contract AF33 616 7157

Unclassified report

Descriptors: *Heat resistant metals and alloys, Molybdenum alloys, Titanium alloys, Zirconium alloys, Tungsten alloys, Palladium alloys, Indium alloys, Niobium alloys, Ruthenium alloys, Tantalum alloys, Rhodium alloys, Hafnium alloys, Osmium alloys, Rhenium alloys, Phase studies.

This report summarizes the work performed on refractory metals phase diagrams. (Author)

AD-402 707 Div. 17
(TISTM/BRW) OTS price $7.60

Fansteel Metallurgical Corp., North Chicago, Ill
TUNGSTEN SHEET ROLLING PROGRAM.
Final rept. 1 June 60-1 Mar 63,
by George C. Bodine, Jr. 1 Mar 63, 1v.
Contract NOw60 0621

Unclassified report

Descriptors: *Tungsten, Sheets, Metal plates, Processing, Cold working, Rolling mills, Sintering, Heat treatment, Manufacturing methods, Mechanical properties, Microstructure, Hardness, Powder metallurgy.

Powder metallurgy tungsten plate and sheet has been produced in quantity according to optimum processing procedures developed in the pilot powder and sheet phases. Inspection and test results show the material to be of good quality but not as consistent as full scale pilot material. Part of the inconsistency results from deviations in original dimensional targets and the resulting processing changes; and part is the result of the diminishing degree of process control which invariably occurs during the transition from pilot to production runs. This final report contains a condensation of all significant information contained in previous interim reports, subsequent work, a complete description of the finished articles, and recommendations based upon the work conducted in the program. (Author)

AD-402 780 Div. 17, 26
(TISTM/AM) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
IMPROVED PRODUCTION OF POWDER METALLURGY ITEMS.

Division 17 - METALLURGY

Interim technical documentary progress rept.
1 Jan-31 Mar 63,
by K. Farrell and N. M. Parikh. 31 Mar 63, 29p.
Contract AF33 657 9140, Proj. 7 911
ASD TDR7 911, vol. 3

Unclassified report

Descriptors: *Sintering, *Powder metals, *Alloys, Density, Particle size, Molybdenum alloys, Chemical analysis, Oxygen, Nitrogen, Iron alloys, Adsorption, Microstructure, Atomization, Powder metallurgy.

The results of sintering studies on atomized superalloy powders and on synthesized TZM alloy powders are discussed. The time and temperature conditions for optimum sintering are defined, and the metallographic structures of the sintered materials are examined. Also, the chemical compositions and gas contents of the alloys are considered in relation to the various stages involved in the manufacture and processing of the superalloys. It is concluded that the boundary conditions for the production of superalloy billets by powder metallurgy techniques are now fairly well established. (Author)

AD-402 793 Div. 17
(TISTP/MFA) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
THERMALLY-ACTIVATED DEFORMATION OF THE BODY CENTERED CUBIC METALS AT LOW TEMPERATURES,
by H. Conrad and W. Hayes. 5 Mar 63, 38p. TDR169 3240 11TN7
Contract AF04 695 169
SSD TDR63 46

Unclassified report

Descriptors: *Metals, *Metallic crystals, Heat of activation, Low temperature research, Symmetry (Crystallography), Shear stresses, Thermal stresses, Deformation, Transition elements, Crystal structure, Nucleation, Tensile properties, Crystal lattice defects, Vanadium, Niobium, Tantalum, Chromium, Molybdenum, Tungsten, Iron.

The activation energy H, activation volume v*, and frequency factor nu for the deformation of Group VA(V, Cb, Ta) and Group VIA(Cr, Mo, W) metals were determined as a function of the thermal component of the stress, tau*, from data in the literature on the interrelationship of stress, temperature, and strain rate. It was found that H0 (tau* app = to 0) 0.1 mu b cubed, where mu is the shear modulus and b is the Burgers vector. Also, v* app = to 50 b cubed at tau* = 2 kg/sq mm, increasing rapidly to values in excess of 100 b cubed at lower stresses and decreasing to 2 - 5 b cubed at high stresses, and nu = 10 to the 4th power 10 to the 11th power 1/sec. The activation energy and volume as a function of stress were independent of structure, indicating that the rate-controlling mechanism for the deformation of body centered cubic metals is overcoming the Peierls-Nabarro force. The experimental data were in agreement with Seeger's model for the thermally-activated nucleation of kinks. The kink energy and the Peierls-Nabarro energy and stress derived from the data were 3 - 4 x 1/100 mu b cubed, 2 - 4 x 1/1000 mu b cubed and 0.6 - 1.5 x 1/100 mu, respectively. (Author)

AD-402 796 Div. 17
(TISTM/BRW) OTS price $3.60

Aerospace Corporation, Los Angeles, Calif.
CORRELATION OF THE THERMAL COMPONENT OF THE YIELD STRESS OF BODY CENTERED CUBIC METALS,
by H. Conrad, and W. Hayes. 1 Mar 63, 26p.
TDR169 3240 11 TN3
Contract AF04 695 169
SSD TDR63 28

Unclassified report

Descriptors: *Transition elements, Crystal structure, Elasticity, Stresses, Deformation, Molybdenum, Iron, Steel, Vanadium, Niobium, Tantalum, Chromium, Tungsten, Group V elements, Group VI elements, Mechanical properties, Thermal stresses.

The variation of the thermal component of the yield stress, tau, with temperature for the Groups VA and VIA body centered cubic transition metals has been determined from data reported in the literature. It was found that the temperature dependence of tau is relatively independent of structure for a purity of < 99.98% by weight, but may decrease for higher purity material and for single crystals as compared to polycrystals, in agreement with what had previously been found for iron. By plotting tau versus the parameter (T-T sub zero)/T sub m, it was possible to correlate the data for all the b.c.c. transition metals. T is the test temperature, T sub zero the temperature where tau is first zero, and T sub m the melting temperature. The present results support thermally-activated overcoming of the Peierls-Nabarro stress as the mechanism responsible for the strong temperature dependence of the yield stress in the b.c.c. metals. (Author)

AD-402 797 Div. 17
(TISTM/AM) OTS price $1.25

Union Carbide Corp., Parma, Ohio.
RESEARCH STUDY TO DETERMINE THE PHASE EQUILIBRIUM RELATIONS OF SELECTED METAL CARBIDES AT HIGH TEMPERATURES.
Rept. for Mar 62-28 Feb 63,
by R. V. Sara, C. E. Lowell, and R. T. Dolloff.
Feb 63, 41p.
Contract AF33 657 8025, Proj. 8 7350 73500
WADD TR60 143, pt. 4

Unclassified report

Descriptors: *Carbides, *Phase studies, Solubility, Crystal lattices, Microstructure, Tantalum, Zirconium, Boron.

This report is the result of investigations of phase equilibria in the binary systems, zirconium-carbon, tantalum-carbon, and boron-carbon. A completed phase diagram which encompasses experimental results and considerations heretofore unreported in the literature, is presented for the zirconium-carbon system. A tentative phase diagram for the tantalum-carbon system is included, which, in general, resembles the version released by Ellinger in 1943. Preliminary results for the boron-carbon system, depicting maximum solubility in the graphite lattice below the eutectic temperature of approximately 2390 C, are also included. The zirconium-carbon system is characterized by eutectic temperatures of 1850 and 2850 C on the zirconium-rich and carbon-rich sides of ZrC, respectively. The tantalum-carbon system is characterized by two high temperature phases, TaC and Ta2C. A eutectic is observed at 2825 C between Ta and Ta2C. Below the B4C-C eutectic temperature of 2390 C, maximum boron solubilities in graphite are found to be 1.50, 2.25, and 2.75 atomic per cent at temperatures of 2000, 2200, and 2350 C, respectively. (Author)

AD-402 854 Div. 17
(TISTP/FEM) OTS price $9.60

ARA, Inc., West Covina, Calif.
RESEARCH ON ENERGY ABSORBING STRUCTURES.
Final rept., Feb 62-Feb 63,
by Bernard Mazelsky, D. L. Platus, P. J. Cunningham, and F. A. Marovich. Feb 63, 101p.
Contract AF49 638 1144, Proj. 9782, Task 37718.
Unclassified report

Descriptors: *Cylindrical bodies, *Metal plates, Stresses, Deformation, Geometric forms, Absorption, Energy, Loading (Mechanics), Differential equations, Integral transforms, Plasticity, Elasticity.

Theoretical and experimental studies of convoluted type structures are described. An incremental method for predicting the nonlinear large-deformation behavior of two-dimensional convoluted strips is shown. The method is applicable for elastic as well as plastic stress-strain behavior of the material. The results of the two-dimensional analysis are extended to an analysis of a circumferentially-convoluted cylinder which deforms into a conical shape. Tests on typical two- and three-dimensional convoluted metal specimens are described and correlations of theoretical predictions with experimental results are shown. (Author)

AD-402 972 Div. 17
(TISTM/AM) OTS price $1.00

Utah U., Salt Lake City.
FRACTURE PROCESSES IN GERMANIUM.
Final rept. 1 June 61-30 Nov 62,
by O. W. Johnson, N. Farb and P. Gibbs. Mar 63, 28p.
Contract AF33 616 6832, Proj. 7350, Task 735001
ASD TDR62 1029
Unclassified report

Report on Refractory Inorganic Non-metallic materials.

Descriptors: *Germanium, *Aluminum compounds, Sapphires, Creep, Single crystals, Deformation Microstructure, Controlled atmospheres, Corrosive liquids, Crystal lattice defects, High-temperature research, Low-temperature research, Metallic crystals, Fracture (Mechanics), Oxides.

The fracture strength, sigma sub F, of germanium at constant loading rate was determined over a temperature range from -196 to 500 C Sigma sub F decreases slowly up to about 200 C, then increases to about 400 C, followed by subsequent decrease. Sigma sub F is found to be essentially independent of ambient for a wide variety of chemical species. These observations are analyzed in terms of fracture nucleation at a flaw near, but not exposed to, the surface, by a presently unknown kinetic process. The role of dislocations apparently is to inhibit fracture by relaxation of stress concentrations up to about 400 C, above which general plastic deformation precedes fracture, suggesting the possibility of fracture nucleation by dislocation pileups. The applicability of this analysis to another brittle system, Al2O3, is considered in the light of its reported fracture, deformation, wear and friction characteristics. Striking similarities are found in the behavior of these two crystals, suggesting that the underlying mechanisms must have much in common. (Author)

AD-403 074 Div. 17
(TISTM/AMS) OTS price $5.60

Materials Research Corp., Orangeburg, N. Y.
THE MECHANICAL PROPERTIES OF TANTALUM WITH SPECIAL REFERENCE TO THE DUCTILE-BRITTLE TRANSITION.
Final rept. 1 Apr 61-1 Apr 62,
by G. T. Murray and R. A. Burn. Mar 63, 45p.
Contract AF33 616 7173, Proj. 7351, Task 735106
ASD TR61 203, pt. 2
Unclassified report

Report on Metallic Materials.

Descriptors: *Tantalum, Equations, Impurities, Oxygen, Carbon, Stresses, Crystal lattice defects, Microstructure, Fracture (Mechanics), Temperature, Grain structure (Metallurgy), Shear stresses, Tensile properties, Low temperature research, Cryogenics, Brittleness, Ductility, Mathematical models, Transition temperature.

The lower yield stress-grain size relationship was studied in tantalum for two compositions; one consisting of a total interstitial content of 72 ppm with the major constituent being oxygen, and the other containing primarily carbon (116 ppm) in which part of the carbon existed in the form of a finely dispersed carbide precipitate. The carbon containing material showed the lowest yield stresses primarily because of its lower oxygen content. It was concluded that oxygen is much more effective than carbon in restricting dislocation movement. The effect of the carbide precipitate was to increase the work-hardening rate. The flow stresses, however, even in the presence of the carbide phase were lower than those observed for commercial tantalum. (Author)

AD-403 144 Div. 17
(TISTM/BRW) OTS price $3.60

Pressure Technology Corp. of America, Woodbridge, N. J.
A STUDY TO DETERMINE THE DEFORMATION CHARACTERISTICS OF BERYLLIUM AND TUNGSTEN UNDER CONDITIONS OF HIGH HYDROSTATIC PRESSURE.
Interim rept. no. 2, 15 Jan-14 Mar 63.
Apr 63, 24p.
Contract N600 19 59430
Unclassified report

Descriptors: *Beryllium, *Tungsten, High pressure research, Hydrostatic pressure, Compressive properties, Tensile properties, Plasticity, Ductility, Extrusion, Brittleness, Stresses, Shear stresses, Deformation.

Tensile and compressive tests under pressure were performed on specimens of sintered polycrystalline tungsten and beryllium. Results are presented as reduction in area versus pressure. A brittle-ductile field is mapped for tungsten from available data. Correlative fluid-extrusions were performed on sintered polycrystalline tungsten and beryllium, and on a single crystal of beryllium. There were indications that crack-free fluid-to-fluid extrusions should be possible for all materials, with additional modes of deformation apparently activated at higher pressure levels. Analysis is presented on the role of pressure in plastic deformation, with extrusion to high-energy forming processes and to notch tensile testing. (Author)

Division 17 - METALLURGY

AD-403 329 Div. 17
(TISTM/AMS) OTS price $1.60

Colorado School of Mines, Golden.
IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
Interim rept. no. 8, 1 Jan-28 Feb 63.
1 Apr 63, 13p.
Contract NOw62 0305d, Proj. 311113
Unclassified report

Descriptors: *Molybdenum, *Oxidation, Oxygen, Hafnium, Rare earth elements, Alloys, Scale, High temperature research, Mathematical analysis, Equations, Temperature, Pressure, Diffusion, Experimental data, Molybdenum alloys.

AD-403 370 Div. 17, 25, 4
(TISTM/AMS) OTS price $1.00

Nuclear Metals Inc., Cambridge, Mass.
SOLUBILITY AND DIFFUSION OF GASES IN BERYLLIUM.
Final rept. Nov 60-Oct 61,
by J. P. Pemsler, R. W. Anderson and E. J. Rapperport. Feb 63, 25p.
Contract AF33 616 7665 , Proj. 7360, Task 736005
ASD TDR62 1018
Unclassified report

Report on The Chemistry and Physics of Materials.

Descriptors: *Beryllium, *Diffusion, Nitrogen, Oxygen, Hydrogen, Solubility, High temperature research, Photon bombardment, Impurities, Gases.

Results of an experimental program to determine the solubility and diffusion rate of nitrogen, hydrogen, and oxygen in beryllium are reported. The solubility of nitrogen in beryllium at 1000 C is estimated to be about 60 ppm; this value appears to be temperature independent. The results of nitrogen diffusion experiments are considered tentative. The solubility of hydrogen in beryllium is believed to be very small. Measurement of the growth characteristics of hydrogen bubbles formed in beryllium by proton bombardment indicate a value for the diffusion coefficient of hydrogen in beryllium of 9 x 10 to the -10 power sq cm/sec at 850 C. Due to limitations of chemical analysis, no new data concerning the beryllium-oxygen system were obtained. (Author)

AD-403 394 Div. 17, 26
(TISTM/AMS) OTS price $8.60

Westinghouse Electric Corp., Blairsville, Pa.
VACUUM ARC MELTING OF TUNGSTEN +0.6 COLUMBIUM.
Final rept. 1 Aug 62-28 Feb 63,
by George A. Reimann. Apr 63, 84p.
Contract AF33 616 7459, Proj. 7351, Task 735101
ASD TDR63 296
Unclassified report

Descriptors: *Tungsten alloys, *Manufacturing methods, Niobium alloys, Impurities, Extrusion, Grain structure (Metallurgy), Low pressure research, Carbon alloys, Oxygen, Zirconium alloys, Titanium alloys, Melting, Tensile properties, High temperature research, Forging, Microstructure, Heat treatment, Molybdenum alloys, Casting, Electrodes, Experimental data, Hardness.

Vacuum arc melting techniques were developed to produce sound 3 1/2- and 4-in. diam ingots of W base alloys. The effect of melting rate on ingot characteristics was determined and the effects of C, O, Zr and Ti on melting characteristics, ingot structure, extrudability, recrystallization, and high temperature tensile properties of the W+0.6%Cb alloy were studied also. Refinement of ingot structure was produced by 0.06 and 0.12% Zr additions and by increasing the melting rate. Coarsening of ingot structure was produced by 0.04% Ti and 500 to 1000 ppm O additions. W+0.6%Cb ingots containing more than 50 ppm C could not be extruded, and correlation between extrudability vs. C content below 50 ppm was not found. Adding 0.12% Zr to the W+0.6Cb alloy significantly improved the 3000 F tensile properties. (Author)

AD-403 395 Div. 17, 26
(TISTM/AMS) OTS price $2.60

Climax Molybdenum Co. of Michigan, Detroit.
RESEARCH AND DEVELOPMENT ON NEW PROCESSES OF PRODUCING DUCTILE MOLYBDENUM.
Progress rept., 1 Aug 62-31 Jan 63,
by M. Semchyshen, Robert Q. Barr, G. G. Chesmar, and A. Phillip Coldren. 15 Feb 63, 19p.
Contract NOrd15915
Unclassified report

Descriptors: *Molybdenum, *Manufacturing methods, Casting, Transition temperature, Powder metals, Impurities, Melting, Oxygen, Carbon, Nitrogen, Low pressure research, Hardness, Microstructure, Ductility, Titanium, Thorium, Impact shock, Chromium alloys, Nickel alloys, Aluminum alloys, Purification, Hydrogen, Extrusion, Brittleness, Experimental data.

Eleven arc-cast molybdenum heats have been prepared in pursuance of the general objective of obtaining molybdenum with a low transition temperature. Deoxidation with carbon, titanium, and thorium has been investigated. One carbon-deoxidized, unalloyed molybdenum heat has been converted to bar stock, and the impact transition temperature has been determined. Small additions of chromium, nickel, and aluminum have been made to arc-cast molybdenum for the purpose of studying the solid-solution softening phenomenon. Two button melts produced by the Bureau of Mines installation at Albany, Oregon, have been examined. On the basis of hardness measurements and chemical analyses, the purity of the molybdenum buttons was not significantly different from that of commercially-available vacuum-arc-cast molybdenum. (Author)

AD-403 419 Div. 17
(TISTM/PCR) OTS price $3.60

Surface Lab., Mass. Inst. of Tech., Cambridge.
FRICTION AND WEAR AT ELEVATED TEMPERATURES,
by Ernest Rabinowicz and Masaya Imai. Mar 63, 35p.
Contract AF33 616 7648, Proj. 7342, Task 734204
WADC TR59 603, pt. 4
Unclassified report

Interim report number 4 on ''Fundamental Research on Macromolecular Materials and Lubrication Phenomena.''

Descriptors: *Friction, *Metals, *Lubrication, Melting, Phase studies, Glass, Sulfates, Sulfur compounds, Sodium compounds, Test equipment, Stainless steel, Powder metals, Titanium, Boron compounds, Oxides, Sliding contacts, Metal films, High temperature research.

Measurements were carried out of the friction

coefficient as a function of temperature using surfaces of stainless steel covered by low-melting metals and non-metals applied in powder form. Some work was also done with a few other metal and non-metal surfaces. In cases where the interaction between the low melting substances and sliding surface is high, as revealed by the occurrence of wetting, the friction reaches a peak just below the melting temperature of the substance, and then drops to considerably lower values just above the melting point. The peak below the melting temperature is associated with the formation of large adhering fragments of the low melting substance on the sliding surface. When there is no wetting, the low-melting substance has, either below or above its melting point, essentially no effect on the friction. (Author)

AD-403 434 Div. 17, 26
(TISTM/AMS) OTS price $1.60

Climax Molybdenum Co. of Michigan, Detroit.
THE DEVELOPMENT AND EVALUATION OF TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 4, 15 Dec 62-15 Mar 63.
15 Mar 63, 9p.
Contract NOw62 0419
Unclassified report

Descriptors: *Tungsten alloys, *Manufacturing methods, Tensile properties, Ductility, Extrusion, Mechanical working, Heat treatment, Niobium alloys, Molybdenum alloys, Carbon alloys, High temperature research, Transition temperature, Zirconium alloys, Boron alloys, Casting, Hafnium alloys.

Tungsten-base alloys and W-3% Mo-base alloys containing nominally 1% Cb, 0.1% Hf, or 0.05% Zr have been successfully converted to 1/2-inch diameter bar stock by extrusion and swaging operations. Short-time tensile tests have been performed to 4000 F. Tentative tensile transition temperatures are reported. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-402 618 Div. 18, 6
(TISTP/MFA) OTS price $9.60

Naval Ordnance Lab., Corona, Calif.
SOME CALCULATIONS OF TARGET TEMPERATURES IN MICROWAVE RADIOMETRY,
by John O. Hooper, and James W. Battles.
15 Mar 63, 106p.
NAVWEPS 8140
Unclassified report

Descriptors: *Radiometers, *Targets, Aircraft, Microwaves, Temperature, X band, K band, Emissivity, Antennas, Tanks (Combat vehicles), Terrain, Roads, Rivers, Armed forces operations, Background, Scattering, Navigation, Guidance, Mathematical analysis, Detection.

Calculations of the radiometric temperature differences between various targets and backgrounds have been performed, and the results are presented in graphical form. In addition, an analysis is made of the effects of the varying target, radiometer system, and weather parameters on the detectability of targets. The data indicate that variable-area targets, such as roads and rivers (especially rivers), will be detectable from very high altitudes during all weather conditions considered. Constant-area targets, such as military tanks and aircraft, will be detectable at much lower altitudes or ranges, unless the area of the target is very large. (Author)

AD-402 626 Div. 18, 15
(TISTP/GRW) OTS price $5.60

System Development Corp., Santa Monica, Calif.
A SIMPLIFIED QUEUEING MODEL FOR THE 465L SYSTEM,
by S. Gorenstein. 15 Mar 63, 53p. TM 1042 104 00
Unclassified report

Descriptors: *Strategic Air Command, *Queueing theory, *Time-lag theory, Operations research, Taylor's series, Integral transforms, Statistical functions, Errors, Command and control systems.

A preliminary investigation is made of the time it takes, under Emergency War Order conditions, for information to be displayed from the time of entry into the 465L system. (Author)

AD-402 772 Div. 18
(TISTP/RD) OTS price $7.60

Office of Naval Research, Washington, D. C.
A STUDY OF THE OPERATIONAL FEASIBILITY OF THE GROUND EFFECT MACHINE IN THE AMPHIBIOUS SUPPORT MISSION.
Summary rept.
Nov 62, 69p. ONR, ACR NAR26
Unclassified report

Descriptors: *Ground effect machines, *Amphibious operations, Feasibility studies, Mathematical models, Hydrofoil boats, Hydrofoils, Vertical take-off planes, Armed forces operations, Marine Corps, Naval operations.

A study was made of the operational feasibility of several theoretical GEMs (ground effect machines) in the amphibious support mission during the assault phase of a landing by a Marine Expeditionary Force (MEF) consisting of a reinforced 1962 division plus wing. Comparisons are made between GEMs and existing transfer vehicles and other theoretical craft and amphibians, notably the hydrofoil. Extensive use was made of high-speed computers and mathematical models based on data for a specific geographical environment. (Author)

AD-402 914 Div. 18, 15
(TISTP/FEM) OTS price $2.60

Operations Evaluation Group, Office of Naval Operations.
A 2-PLAYER N-REGION SEARCH GAME,
by Joseph Bram. 17 Jan 63, 21p. IRM31
Unclassified report

Descriptors: *Game theory, *Statistical analysis, Statistical functions, Integral equations, Matrix algebra, Sequences, Probability.

Given N regions with their associated conditional detection probabilities alpha sub 1 ..., alpha sub N, let player A choose one region to hide in, and let player B look in one region at a time until he finds A. The payoff, to player A, is the expected number of looks required of B to find A. The form of the optimal pure strategies for B is described, and the mixed extension of this game is shown to have a solution. Player B has a good strategy that is a mixture of at most N pure strategies. A numerical procedure for calculating the solution is given. (Author)

Division 19 - NAVIGATION

AD-403 071 Div. 18, 20
(TISTM/PCR) OTS price $8.60

Research Triangle Inst., Durham, N. C.
RESEARCH TRIANGLE INSTITUTE OPERATIONS RESEARCH DIVISION.
Final rept.,
by K. E. Willis, E. R. Brooks, and L. J. Dow.
30 Apr 63, 1v. R 85 1
Contract OCD OS62 109, Proj. 4201
Unclassified report

Descriptors: *Civil Defense Systems, Dispersion hardening, Population, Shelters, Communication systems, Analysis, Shielding, Thermal radiation, Countermeasures, Effectiveness.

A crash civil defense program is one which is implemented one to fourteen days prior to attack. It is initiated because of a political or military crisis. This study identifies and analyzes several measures that can be effective in this time period in dispersing and protecting population and resources. The problems associated with constructing a crash plan prior to implementation are identified, and some principles for crash planning are given. The major conclusion is that crash planning can significantly improve existing civil defense capabilities. Several actions are recommended which would lead to operational crash planning. (Author)

AD-403 342 Div. 18
(TISTP/FEM) OTS price $2.60

Pacific Missile Range, Point Mugu, Calif.
A MATHEMATICAL FORMULATION AND SOLUTION OF A MULTIPLE-RESOURCE SCHEDULING PROBLEM,
by R. V. Skarda, Jr. 1 May 63, 21p. TM63 6
Unclassified report

Descriptors: *Scheduling, *Logistics, Time, Probability, Vector analysis, Dynamic programming, Programming (Computers), Mathematical analysis, Operations research.

An algorithm is proposed for determining optimal ways of scheduling multiple operations, each of which must be serviced by a number of resources simultaneously. The objective is to allocate the resources on a time-scale such that all the desired operations may be completed in the minimum time possible. By means of a selective searching procedure, the algorithm in effect considers all possible allocations but in much less time than direct enumeration would entail. The result is an optimal schedule or time sequence for operations. The basic inputs to the algorithm are each operation's time requirements on each type of resource and a statement of the resources which the servicing system has available for allocation. The procedure is deterministic in the sense that the operational time requirements, which are in truth probabilistic, are assumed to be known exactly. The algorithm was developed as a possible means for scheduling operations on the Pacific Missile Range. In that context, the many operations and even greater number of resource types which must be considered necessitate the use of a large-scale digital computer to execute the algorithm. (Author)

AD-403 367 Div. 18, 22, 27
(TISTW/JEA) OTS price $10.50

Rocket Power, Inc., Mesa, Ariz.
PYROTECHNIC OUTSIDE WARNING SYSTEM.
Final rept. on Phase 1.
Mar 63, 1v. 7606A
Contract OCD OS62 76
Unclassified report

Descriptors: *Warning systems, *Smoke projectiles, *Rocket flares, Passive defense, National defense, Control systems, Monitors, Control sequences, Design, Multiple operation, Launching, Propulsion, Specifications, Tests, Rocket launchers, Rocket motors (Solid propellant), Rocket propulsion, Rocket assisted projectiles, Pyrotechnics.

The POWS was conceived as a complement to the National Emergency Alarm Repeater System (NEARS), which will provide indoor warning. The POWS is designed to meet the need for a mass, low-cost outdoor alert system which can provide instant audible and visual warning, day or night. The POWS is a compact, lightweight package containing two warning rockets and a special control unit. Each rocket is sealed in a metal tube. The control unit is sealed in a separate enclosure between the tubes. These POWS units can be mounted on any poles or buildings having access to ordinary 60-cycle power. The control unit constantly monitors the power line to detect the presence of a NEAR signal. Upon receiving this signal, the control unit will fire one rocket, sequence to the second and await another signal. The POWS components are housed within the rocket vehicle casing, and are ejected when the rocket vehicle reaches its terminal altitude. The warning components are an explosive charge, a red smoke cloud, and an intense red flare. The flare and all hardware are lowered by parachute. The requirements for the POWS are extremely rigorous. The units must withstand temperatures ranging from -65 degrees to +200 degrees F. for a minimum of ten years and remain operable without maintenance. (Author)

19. NAVIGATION

AD-402 699 Div. 19
(TISTP/RD) OTS price $7.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
FEASIBILITY STUDY FOR PLACEMENT OF VORTAC AT SEA.
Final rept.,
by Raymond A. Yagle, George L. West, Jr., and Joseph W. Little. Apr 63, 68p. 4981 7F
Contract ARDS499
Unclassified report

Descriptors: *Navigational aids, Feasibility studies, Buoys, Manned, Radio navigation, Oceans, Mooring.

The purpose of this study was to make a sound determination on the feasibility of various structures for positioning a VORTAC at sea. The primary contractual restraints on the project were that the study should be applicable to a single facility located at Ocean Station Charlie (latitude 52 degrees 45 minutes N, longitude 35 degrees 30 minutes W), that costs would be minimized, and that personnel safety would be paramount. The study extended to the broad categories of operating vessels and moored platforms. The latter category was divided to include discussion of manned and unmanned craft, such as Liberty ships, submarines, seadromes and buoys. Of major concern in keeping the study within the imposed limits were the problem of deep-water anchoring in the North Atlantic and the reliability of present VORTAC electronic systems in a continuous, infrequently maintained application. Other troublesome problems were crew comfort, reprovisioning techniques in a continual heavy-sea environment, and the structural design of the antenna complex. Recommended methods of deep-water mooring and of heavy-weather transfer operations have been discussed in detail, and suggested solutions outlined for each substantial difficulty encountered. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-402 668 Div. 20
(TISTM/AW) OTS price $7.60

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Final technical rept.,
by R. A. Karam, T. F. Parkinson, and W. H. Ellis. 1 Mar 63, 72p.
Contract NOas60 6021
Unclassified report

Descriptors: *Rhenium, *Nuclear properties, Neutron cross sections, Neutron reactions, Gold, Neutron capture gamma rays, Shielding, Lead, Detectors, Sodium compounds, Iodides, Control rods, Neutron activation, Decay schemes, Radioactive isotopes, Nuclear engineering.

The thermal neutron activation cross sections of Re-185 and Re-187 were measured and found to be 96.5 ± 10 barns and 88 ± 14 barns, respectively. The effective resonance integral of natural rhenium was measured to be 694 ± 28 barns including the 1/v component. The (n, 2n) cross sections of Re-185, Re-187, and Re-185 (n, 2n) Re-184m with 14.1 Mev neutrons were found to be 1.91 ± 0.6 barns, 1.44 ± 0.41 barns and 1.12 ± 0.4 barns, respectively. The (n, alpha) reaction with 14.1 Mev neutrons was investigated theoretically and it was concluded that this reaction does not occur. The (n, p) reaction was also investigated on a theoretical basis and it was found that this reaction is improbable with 14.1 Mev neutrons. The cross section of this reaction was calculated to be 32.2 millibarns. This calculation, however, could be in error by a factor of 10. The decay scheme of Re-184 - Re-184m is proposed and the gamma rays from Au-196 and Au-196m were studied. Comparison of the shielding properties of rhenium and lead for thermal neutrons was made on a theoretical basis. A technique for separating gamma ray pulses from neutron pulses in NaI (Tl) detectors is also included. (Author)

AD-402 674 Div. 20
(TISTP/JW) OTS price $2.60

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROCOPY. CYCLOPROPANE DERIVATES,
by Dinshaw J. Patel, M. E. H. Howden and Joh D. Roberts. Apr 63, 25p. TR21; 2964
Contract Nonr220 26, Proj. NR055 388
Unclassified report

Descriptors: *Organic compounds, *Magnetic properties, *Nuclear resonance, *Nuclear magnetic resonance, Protons, Chemical reactions, Bibliographies, Organic compounds, Other, Resonance, Spectroscopy.

Chemical shifts and coupling constants have been determined from the analysis of proton nuclear magnetic resonance spectra for a series of cyclopropane derivatives. The geminal and vicinal cyclopropyl couplings have opposite signs. Additional 13C-H coupling constants have been obtained for cyclopropanes which support the conclusion that the hybridization of the carbon bonding orbitals in cyclopropanes is close to sp2. The chemical shifts for several cyclopropane hydrocarbons seem consistent with a ring-current effects. (Author)

AD-402 695 Div. 20, 4
(TISTP/FEM) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
A NUCLEAR-PHOTON ENERGY CONVERSION STUDY.
Final rept., Apr 62-Feb 63,
by H. V. Watts, M. D. Oestreich, and R. J. Robinson. Mar 63, 61p.
Contract AF33 657 8527, Proj. 8173, Task 817301 17
ASD TDR 63 244
Unclassified report

Descriptors: *Energy conversion, *Nuclear energy, Photoelectric cells (Semiconductors), Radioactive isotopes, Beta particles, Absorption, Luminescence, Phosphorescent materials, Electric potential, Radiation effects, Temperature, Silicon, Zinc compounds, Photons.

A double energy conversion technique was studied for aerospace use as a radioisotope powered 10 watt electrical output power source. In this technique, beta particles from a radioisotope are absorbed by a luminescent material which emits a multiplicity of low energy photons. These photons are then converted to electrical energy by a photovoltaic device. The three components (radioisotope, phosphor, and photovoltaic cell) are discussed individually and then in combination in various geometries of source-phosphor and phosphor-photovoltaic converter. Nuclear radiation effects on the phosphor and photovoltaic materials restrict the choice of the radioisotope to a low energy beta emitter; and temperature effects limit the number of unit power cells which may be stacked in one bundle. These effects are more pronounced in silicon photovoltaic converters than in ZnCdS: Cu type phosphors. A ten watt output power source fabricated with currently available materials (Pm-147, ZnCdS: Cu, and silicon photovoltaic cells) would have an overall energy conversion efficiency of about 0.2 percent and a power per weight ratio of 4 mw/lb. It is estimated that the power per weight could be increased by a factor of ten to forty if certain ideal materials were available. The rapid decrease in photovoltage and energy conversion efficiency of silicon cells at low illumination intensities causes an appreciable loss in the overall efficiency of such power source. (Author)

AD-403 020 Div. 20
(TISTP/JW) OTS price $8.10

Boeing Scientific Research Labs., Seattle, Wash.
TRAPPED RADIATION AND IONOSPHERIC PERTURBATIONS DUE TO AN IMPULSIVE NEUTRON SOURCE,
by James F. Kenney and H. R. Willard. Apr 63, 77p. D1 82 0241
Unclassified report

Also available from the author.

Descriptors: *Nuclear reactions, *Ionospheric disturbances, Neutrons, Degradation, Density, Very low frequency, Perturbation theory, Radiation effects.

Extensive interest has been shown in the geophysical perturbations associated with nuclear testing. Studies of the large scale displays resulting from this type of controlled stimulus may be used to shed light on the details of the mechanisms responsible for naturally occurring geophysical phenomena. Computations based on the neutron decay model postulated by Crain and Tamarkin (1961) have been carried out to evaluate the contribution of the decay products of neutrons emitted from a fission reaction to associated ionospheric disturbances and trapped

radiation increases. It is shown that the fission neutron source is useful in explaining the morphology of nuclear-associated VLF effects although the amount of ionization produced promptly in the D-region may be insufficient to account for the magnitude of these effects. Experimental evidence is also advanced to show detection of short-lived trapped radiation from this neutron decay source. The contribution to the long-lived trapped radiation is shown to be negligible. (Author)

AD-403 022 Div. 20
(TISTM/ODN) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
A RAPID RADIOCHEMICAL PROCEDURE FOR TIN,
by A. E. Greendale and D. L. Love. 28 Feb 63, 17p.
NRDL TR632 Unclassified report

Descriptors: *Radiation chemistry, *Tin, *Isotope separation, Isotopes, Borohydrides, Sodium compounds, Antimony, Tin compounds, Hydrides, Antimony compounds, Decontamination, Fission products, Arsenic, Iodine, Tellurium, Test equipment, Half life.

A very rapid radiochemical procedure has been developed for the isolation of radioisotopes of tin from their fission-product isobars. An irradiated uranium solution containing tin and antimony carriers is added to a solution of sodium borohydride. The volatile stannane (SnH_4) formed is decomposed in a hot quartz tube to the metal, which is collected on a cold surface. Stibine (SbH_3), which is also formed under these conditions, is removed by absorbtion on an 'ASCARITE' column. The tin chemical yield ranges between 15% for an Sb decontamination factor of 20,000 to 60% for an Sb decontamination factor of 1,000. The time required for separation of the tin metal from the other fission product elements is about 10 sec. Decontamination factors of other Sn descendents are: I > 70,000, and Te > 20,000. Arsenic is also volatilized as the hydride; however, it is not necessary to eliminate it in this work for the determination of the Sn fission yield. (Author)

AD-403 028 Div. 20, 22
(TISTW/JEA) OTS price $13.50

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION, VOLUME I.
Final rept.,
by G. F. McDonough, Jr. 15 Mar 63, 194p.
Contract DA49 146xz073, Task 13.092
DASA 1357, vol. 1
Unclassified report

Descriptors: *Nuclear weapons, *Explosion effects, *Underground structures, Surface area, Cratering, Radiation effects, Electromagnetic properties, Shock waves, Stresses, Motion, Deformations, Load distribution, Analysis, Distribution, Statistical analysis, Nuclear explosion damage, Nuclear explosions, Surface burst.

The primary purpose of this description of nuclear weapon effects in the close-in region is to provide the designer of protective construction useful inputs for structural analysis and design. Additional information useful in designing interior equipment and shock mount systems is included; however, the emphasis is on structures and the data presented are in a form best suited for the design of structures. The phenomena most important in such design include air blast and ground shock pressures together with ground motions. These are described quite thoroughly. Radiation effects, such as nuclear and thermal radiation as well as electromagnetic disturbances, require less extensive discussion and are treated only briefly. (Author)

AD-403 038 Div. 20
(TISTP/JW) OTS price $1.10

Weizmann Inst. (Israel).
RESEARCH ON APPLICATION OF NUCLEAR SHELL MODEL TO CALCULATION OF ENERGIES OF GROUND STATES AND EXCITED STATES OF NUCLEI.
Final rept., 1 Nov 61-31 Oct 62,
by Amos De-Shalit. Mar 63, 5p.
Grant AF AEOR62 56
ARL 63 61 Unclassified report

Descriptors: *Nuclear models, *Excitation, Deformation, Particles, Nuclei, Energy.

AD-403 073 Div. 20, 22
(TISTW/JEA) OTS price $11.00

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION, VOLUME IV.
Final rept.
by G. F. McDonough, Jr. 14 Mar 63, 1v.
Contract DA49 146xz073
DASA 1357, vol. 4
Unclassified report

Descriptors: *Nuclear weapons, *Explosion effects, *Underground structures, Nuclear explosion damage, Equations of state, Pressure, Statistical analysis, Motion, Detonation waves, Distribution, Shock waves, Rock (Geology), Loading (Mechanics), Propagation, Wave transmission, Soils, Partial differential equations, Nuclear explosions, Surface burst.

Contents:
The Hugoniot equation of state
Statistical determination of the equation of state at high pressures
SRL formulation and results
Gilbert Rayleigh-wave solution
Rocket property data
Equations for axially symmetric wave propagation in soil
Uniform exponential pressure pulse

AD-403 276 Div. 20
(TISTP/MH) OTS price $3.60

Colorado State U., Fort Collins.
A CASE STUDY OF RADIOACTIVE FALLOUT,
by Elmar R. Reiter. Jan 63, 35p. TP42;
CER63ERR7.
Contract N189 188 55120
Unclassified report

Descriptors: *Radioactive fallout, *Gamma rays, *X-rays, Scintillation counters, Meteorological balloons, Jet streams.

During September 1961 a series of balloon ascents made from Flin Flon, Canada, carrying scintillation counters sensitive to gamma radiation, revealed the existence of shallow stable atmospheric layers carrying radioactive debris, presumably from the Russian test series during the same month. The debris layers encountered

on September 14 and 15 have been studied in particular. The debris detected over Flin Flon on September 14, 2221 GCT, at 650 mb had undergone strong sinking motion. One may conclude that it came out of the stratosphere shortly prior to September 13, 12 GCT, entering the troposphere through the stable layer underneath the jet core, sometimes referred to as ''jet-stream front''. Beginning with September 17 a distinct area of radioactive fallout begins to appear at the surface over the eastern United States. Some of this debris seems to be identical with the one detected over Flin Flon, and it apparently was transported by the same jet stream. Part of the fallout is associated with a small collapsing cold dome travelling ahead of this jet stream. (Author)

AD-403 358 Div. 20, 4
(TISTM/ODN) OTS price $2.60

Durham U. (Gt. Brit.).
EFFECTS OF IONIZING RADIATIONS ON AQUEOUS SOLUTIONS OF FORMIC AND OXALIC ACID.
Final technical rept., 1 Nov 61-1 Nov 62,
by Joseph J. Weiss. Nov 62, 26p.
(Contract DA91 591EUC1977
Unclassified report

Descriptors: *Water, Chemical reactions, Ionization, Solutions, Gamma rays, Cobalt, Sodium compounds, Bicarbonates, pH, Nitrogen compounds, Oxides, Hydrogen, Hydrogen peroxide, Free radicals, Radiation effects.

In aqueous solutions CO2 and bicarbonate react with negatively charged polarons (H2O)- formed by the irradiation of water by gamma-rays, leading to formation of the carboxyl radical ion. In the presence of organic solutes, the carboxyl radical ion may add on to other free radicals, e.g. those formed by the action of radiation-produced OH radicals on organic solutes, to give the corresponding carboxylic acids. Using C-14 labelled carbon dioxide or bicarbonate, this process could provide a method for the production of carboxylic acids labelled in the carboxyl group. In neutral solutions two reducing species, i.e. negative polarons and primarily formed H atoms, have been shown to be present in irradiated water; their reactions with various solutes have been studied. All irradiations were carried out with Co-60 gamma rays. For irradiation of aqueous solutions in the presence and absence of different gases (O2, CO2, N2O) standard irradiation techniques were used. Analysis of the gaseous irradiation products was carried out by means of the mass-spectrometer. Other irradiation products were determined spectrophotometrically or by radioactive tracer techniques. (Author)

AD-403 371 Div. 20, 2
(TISTP/JW) OTS price $1.65

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR NEVADA TEST SITE SOIL.
Rept. no. 2,
by Frank J. Allen, Arnold Futterer and William Wright. Jan 63, 255p.
APG BRL1190
Unclassified report

Descriptors: *Soils, *Neutrons, Reflection, Test facilities, Radiation effects, Neutron flux, Tables.

Detailed calculated results on neutron reflection and flux versus depth for Nevada Test Site soil are given in the form of machine printouts. The angular and energy distributions of the reflected neutrons along with the energy-dependent and total flux at various depths are contained in tabular form on the printouts. Neutron number current, number flux and dose transmission as functions of thickness are also given in tabular form on the printouts. Tables of summary information on reflection are presented. These contain number current, number flux, dos and energy reflection factors as functions of incident energy and angle. A few figures are presented to illustrate graphically the meaning of the various tabular results. (Author)

AD-403 411 Div. 20
(TISTP/JW) OTS price $13.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
SPHERICAL NUCLEI WITH SIMPLE RESIDUAL FORCES,
by Leonard S. Kisslinger and Raymond A. Sorensen.
16 Apr 63, 1v. TR11
Contract Nonr76015 Proj. NR012 202
Unclassified report

Descriptors: *Nuclear properties, Moments, Nuclei, Particles, Beta decay, Excitation, Phonons, Magnetic properties, Electromagnetic properties, Dipole moments, Energy.

AD-403 485 Div. 20
(TISTP/WH) OTS price $1.75

Technical Research Group, Syosset, N. Y.
THE SPM METHOD FOR NEUTRONS.
Final rept., 15 Dec 60-15 Apr 62,
by R. Aronson and J. Heitner. Mar 63, 64p.
Contract AF33 616 7732, Proj. 7360, Task 736003
ASD TDR63 89 Unclassified report

Descriptors: *Neutrons, *Inelastic scattering, *Statistical processes, Neutron cross sections, Hydrogen, Carbon, Difference equations, Transport properties, Programming (Computers).

The Stochastic Process Method (SPM) was programmed for neutron problems and the method was investigated both theoretically and numerically. The problem was analyzed sufficiently to determine proper source and interface conditions, as well as appropriate methods of treating scattering by hydrogen and inelastic scattering by heavy elements within the spirit of the method. In this report are presented the SPM equations with boundary conditions, a discussion of some of the results, and operating instructions for the IBM-7090 SPM code and for the auxiliary input code GENUC. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-402 634 Div. 22, 1
(TISTA/GEC) OTS price $3.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION MODIFICATION OF B-37K1 BOMB RACK ON F-105 AIRCRAFT FOR MARK 6 MOD 6 FLARES.
Feb 63, 27p.
TAC TR62 78

Unclassified report

Descriptors: *Bomb racks, Acceptability, Compatibility, Jet fighters, Aircraft flares.

Tests were conducted to evaluate the capability of the F-105 to carry a B-37K1 Bomb Rack modified for Mark 6 Mod 6 flare carriage. No F-105 sorties were flown during this development program. Numerous ground tests of this rack, flare, combination demonstrated 100% reliability of this modification. Inflight evaluation during William Tell, 1962, with F-100 type aircraft, indicated completely satisfactory operation of the B-37K1 rack modified for Mark 6 Mod 6 flare carriage and delivery. This report provides modification instructions for the B-37K1 rack, loading procedures for the rack and Mark 6 Mod 6 flares in check list form, and required cockpit settings for expending the subject flares. (Author)

AD-402 691 Div. 22
(TISTP/MFA) OTS price $1.60

Republic Aviation Corp., Farmingdale, L. I., N. Y.
MAGNETIC INDUCTION GYROSCOPE RESEARCH AND DEVELOPMENT.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 62. 20 Dec 62, 12p. 1095
Contract NOw62 0660

Unclassified report

Descriptors: *Gyroscopes, *Nuclear resonance, Magnetic navigation, Magnetic fields, Relaxation time, Coils, Simulation, Tests, Signals, Inductance, Models (Simulations), Rotation.

Theoretical and experimental research and development work on the magnetic induction gyroscope during the period 1 September 1962 through 30 November 1962 is described. Prior research and development on the magnetic induction gyroscope resulted in the establishment of a nuclear resonant signal utilizing simulated rotation, i.e., the generation of a voltage, dependent upon a simulated rotational velocity, in a suitably located coil. The complete verification of gyroscopic behavior as theoretically predicted requires the use of an actual rotating model. This model was designed, its construction completed early in the quarter, and preliminary simulated rotation experiments were initiated. Simultaneously, additional experiments utilizing the simulated rotation model continued. Activities during the next quarter will be concentrated on the further development of the magnetic induction gyroscope rotating model. (Author)

AD-402 715 Div. 22
(TISTP/PCR) OTS price $1.60

Scintilla Div., Bendix Corp., Sidney, N. Y.
SQUIB DEVELOPMENT PROGRAM.
Quarterly rept. no. 3, 1 Jan-31 Mar 63, by Rolland M. Purdy, Sr. 31 Mar 63, 9p.
Contract N178 8081

Unclassified report

Descriptors: *Explosives initiators, *Hazards, Spark ignition, Semiconductors, Production, Seals (Stoppers), Manufacturing methods, Molding, Firing tests (Ordnance), Tests, Ceramic materials, Radiofrequency.

The design and development of an electro-explosive device embodying a spark gap shunted by a semiconductive material is reported. The intent of this design is to render the device immune to stray radio frequency energy. Various investigations and tests conducted during the report period are included. Improvements were made in the manufacture of the ceramic squib bodies. Methods of high-temperature sealing were investigated. Squibs in quantity were built and tested. These tests are reported. (Author)

AD-402 808 Div. 22
(TISTP/RD) OTS price $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
METHOD FOR COMPUTING THE FIRST-ROUND HIT PROBABILITY FOR AN ANTITANK WEAPON WITH SPOTTING RIFLE CONTROL,
by Arthur D. Groves. Jan 63, 72p. Memo. rept. no. 1450
Proj. 503 05 005

Unclassified report

Descriptors: *Antitank guns, *Recoilless guns, *Firing error indicators, Spotting rounds, Self propelled guns, Spotting rifles.

A detailed analysis is made of the factors which contribute to the accuracy of a spotting rifle controlled antitank weapon. The manner in which each source of error contributes to the total error is discussed, and two methods of computing quasi-combat first-round hit probability are presented. The entire method is illustrated by a complete determination of the hitting potential of the 106mm recoilless rifle (M40) using the .50 caliber spotter (M8) under an assumed quasi-combat environment. (Author)

AD-402 811 Div. 22, 24
(TISTW/JEA) OTS price $3.60

Edgerton, Geomeshausen and Grier, Inc., Boston, Mass.
PHOTOGRAPHY OF AN EXPLODING 100-TON TNT CHARGE,
by Donald F. Hansen and George H. Hetley, Jr.
30 Jan 63, 28p. B2528
Contract AF30 602 2546
RADC TDR63 89

Unclassified report

Descriptors: *Explosions, *TNT, *Explosions, *High speed photography, Photographs, Energy, Measurement, Cameras, Photographic equipment, Lenses, Instrumentation, Detonations, Electromagnetic waves, Detonation waves, Photography, Photographic analysis.

The detonation of a 100-ton TNT charge took place on 3 August 1961 at the Suffolk Proving Ground near Medicine Hat in Alberta Province, Canada. The EG&G effort on the explosion was intended to (1) measure the electromagnetic (EM) signals, and (2) perform high speed photographic measurements to assist in the analysis of the EM data. This report contains only a description of the photographic phase of the effort. A 35 mm Fastax framing camera operating in a conventional manner, and a similar instrument modified for streak camera operation were used. Both cameras operated in nearly every respect as intended. The record for the framing camera lasted for 4.5

seconds, however at +30 msec, the entire field-of-view was filled by the fireball. The streak camera recorded for a similar length of time, but useful radius vs time data could only be obtained during the first 18 msec of the explosion, at which time the streak camera's field-of-view was filled by the fireball. (Author)

AD-403 032 Div. 22
(TISTW/JEA) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
HYDRA PROGRAM: THE NRDL LOW-YIELD UNDERWATER EXPLOSION TANK AND ASSOCIATED INSTRUMENTATION, by R. R. Buntzen. 18 Feb 63, 21p.
NRDL TR623

Unclassified report

Descriptors: *Nuclear explosions, *Underwater explosions, *Exploding wires, Electric discharges, Tanks (Containers), Instrumentation, Trigger circuits, Pressure, Simulations.

A facility was designed and constructed to simulate underwater nuclear explosions on a very small scale by employing a submerged exploding wire in a contained environment. This facility is a laboratory complement to the NRDL HYDRA Program. The variable pressure explosion tank and related mechanical features are described. Development of the energy storage system, trigger, and discharge circuit for the submerged exploding wire are discussed. The instrumentation needed to determine the explosion yield and the results for a 25 kv discharge are given. (Author)

AD-403 123 Div. 22, 20
(TISTW/JEA) OTS price $4.60

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
UNDERGROUND EFFECTS OF NUCLEAR WEAPONS IN THE CLOSE-IN REGION, VOLUME III.
Final rept.,
by G. F. McDonough, Jr. 15 Mar 63, 44p.
Contract DA49 146xz073, Task 13 092
DASA 1357, Vol. 3

Unclassified report

Descriptors: *Nuclear weapons, *Explosion effects, *Underground structures, Nuclear explosion damage, Pressure, Wave transmission, Surface properties, Soils, Rocks (Geology), Silos, Structural properties, Distribution, Statistical analysis, Structures, Nuclear explosions, Surface burst.

This resume of free field effects is based entirely on the data presented in Volumes I, II, and IV. The discussion is given in two parts: air-induced effects and directly-transmitted effects. No means of combining air-induced and directly-transmitted effects has been developed as yet; therefore, only surmise is possible regarding the possible combination of these effects. This part of the description of close-in weapons effects will remain unknown until a study of this aspect of the problem has been made. Such work has been proposed and results are to be expected within a year. (Author)

AD-403 263 Div. 22, 30
(TISTM/AMS) OTS price $6.60

Tronchemics Research, Inc., Minneapolis, Minn.
PROGRAMMING AND COMPUTING SERVICE FOR EVALUATION OF COMPOSITE ARMOR.
Final rept.
1963, 1v.
Contract DA19 129qm2058, Proj. 7X80 05 001

Unclassified report

Descriptors: *Armor, *Programming (Computers), Experimental data, Penetration, Analysis, Equations, Velocity, Ballistics, Terminal ballistics, Composite materials.

A program was written to compute the residual velocity for a given striking (initial) velocity for a composite of three (or two) layered materials within three different total weight limits, M, (18, 28, 38 oz/sq ft) at intervals of 2 oz/sq ft in order to locate optimum combinations for minimum projectile velocity of perforation. The resultant program considered all combinations of three materials (as well as two) varying the amounts of each from zero to the pertinent weight limits mentioned above. Material combinations of the form A B A (where A and B are material types) were also included. From the results of each combination of materials and weights for a given initial striking velocity the 'ten best armor' combinations were obtained. These combinations would result in the lowest perforation velocities. (Author)

23. PERSONNEL AND TRAINING

AD-402 732 Div. 23
(TISTB/AW) OTS price $.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PRELIMINARY EVALUATION OF A PROTOTYPE AUTOMATED TECHNICAL TRAINING COURSE.
Final rept., Jan-June 61,
by Felix F. Kopstein, Richard T. Cave, and Virginia Zachert. July 62, 22p.
Proj. 1711, Task 171101
MRL TDR62 78

Unclassified report

In cooperation with U.S. Industries, Inc., New York, Contract AF33 616 6983.

Descriptors: *Teaching machines, Air Force, Students, Film projectors, Automation, Training, Military personnel, Electronics.

This field study constituted a preliminary evaluation of intrinsic programming for automated training. Automated instructional materials used during the first 6 weeks of the Communications Electronics Principles course were presented to beginning electronics students via 35-mm film on the AutoTutor Mark I, a rearview projection machine. Using the Keesler Mathematics Test, three groups--experimental, control, and blind control--were selected and matched from the middle ability range of each of two entering classes. The experimental group received, via the machines, all instruction normally received through lecture and discussion. However, they followed the usual method for their practical problems. The students using machines learned adequately from this experimental program. The interpretations of these results and implications for Air Force training are discussed. (Author)

AD-402 973 Div. 23
(TISTB/AW) OTS price $.50

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
A DIFFERENTIAL INFLUENCE OF AUGMENTED FEEDBACK ON LEARNING AND ON PERFORMANCE.
Final rept.,
by Robert G. Kinkade. Feb 63, 10p.
Contract AF33 616 6964, Proj. 7183, Task 718306
AMRL TDR63 12

Unclassified report

Doctoral thesis on Psychological Research on Human Performance.

Descriptors: *Training, *Tracking, Signals, Effectiveness, Feedback.

A test was conducted of the hypothesis that the training value of augmented feedback in a tracking situation will depend upon the discernibility of input and fundamental feedback signals. Subjects performed a one-dimensional compensatory tracking task using a knob for positional control over the cursor. For two of four groups of subjects the reference element was noisy, oscillating at random about a null position, while for the other two it was not. Augmented feedback, in the form of auditory clicks at the rate of 2 per second when on target, was given one of each pair of groups during training. On subsequent tests the performance of the group trained with augmented feedback and performing with the noisy display deteriorated to the level of its control group trained without feedback. But, the performance of the group trained with augmented feedback and performing on the noise-free display continued unchanged and superior to that of its control group trained without feedback. The results are regarded as confirming the hypothesis and as helping to explain previous contradictory findings on the value of augmented feedback. (Author)

AD-403 344 Div. 23
(TISTB/AW) OTS price $1.16

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PERFORMANCE EVALUATION OF APPRENTICE WEATHER OBSERVERS. GRADUATES OF ATC COURSE ABR25231.
Final rept.,
by Earl F. Pruitt. Apr 63, 17p.
Proj. 0034Q34
APGC TDR63 26

Unclassified report

Descriptors: *Job analysis, *Weather stations, Effectiveness, Standards, Training, Military requirements, Military personnel.

Apprentices graduated from this course are well prepared to meet the requirements of the Job Training Standard and most of the job requirements. The recommendations include that instructors place more emphasis on the requirement for accuracy in the use of equipment and in taking readings and plotting weather data, and that during Block IV of the course (a period devoted to practical exercises in the operation of a weather station) more assignments be made which will require apprentices to research Air Weather Service manuals and publications. The evaluation indicated that the course would be more closely aligned with the job requirements if the course levels established in the Job Training Standard for the following tasks were increased: (a) observes, records, and encodes storms using radar observations; (b) uses AFCSM 105-2 series; and (c) uses AWSM 105-2 series. As a result of indications of excessive or unproductive training, an investigation was recommended to determine the feasibility of reducing the course in the following areas: (a) practical exercises devoted to plotting weather data; (b) operator familiarization of the AN/CPS-9 radar; and (c) mathematical computations of sea-level pressure, altimeter setting, dew point and relative humidity. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-402 836 Div. 24
(TISTP/FEM) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
ON LATENT IMAGE FADING IN ILFORD K.0 AND K.2 EMULSIONS,
by E. V. Benton. 4 Jan 63, 20p. TR610
Task 0549

Unclassified report

Descriptors: *Charged particles, *Images, *Photographic emulsions, Colloids, Photomicrography, Energy, Mass-energy relation, Time, Temperature, Moisture, Sensitivity, Attenuation, Tracking.

Fading in Ilford K.0 and K.2 emulsions was investigated at +20 degrees C and -20 degrees C. Track segments with rates of energy loss from 0.6 to 1.8 Mev/micron were used. K.0 and K.2 emulsions stored for 30 days at -20 degrees C showed no evidence of fading. After a 30-day fading period, K.2 emulsion stored at +20 degrees C and at 50 percent relative humidity showed less than 10 percent fading. K.0 emulsion stored at +20 degrees C and at 50 percent relative humidity showed severe fading. This is illustrated by curves of grain density versus residual range for 2-, 6-, 13-, and 30-day fading periods. (Author)

AD-402 952 Div. 24, 26
(TISTP/FEM) OTS price $6.60

Bell and Howell Co., Chicago, Ill.
ASPHERIC OPTICAL ELEMENTS PROGRAM.
Interim technical rept. no. 15, 1 Jan-31 Mar 63,
by Marvin Royston. 31 Mar 63, 64p.
Contract AF33 600 37199

Unclassified report

Descriptors: *Aspherical lenses, *Photographic lenses, Control systems, Low frequency, Density, Pulse modulation, Signal-to-noise ratio, Magnetic materials, Coatings, Velocity, Errors, Magnetic fields, Computers, Amplifiers, Functions, Differential equations, Preamplifiers, Transistor amplifiers, Manufacturing methods.

Investigation of production manufacturing methods for aspheric lens surfaces continued. The period which precedes the start of integration of the entire control complex with the machine tool itself is reported. This is significant in that many problems present a choice of multiple solutions with an extensive range of apparent reliability and cost implications. Means of improving pulsing techniques for the low surface speed and high packing density required is being researched. The details of the means by which the resulting reliability of magnetic pulsing was accomplished is reported. Parallel with this activity, a new translator has been nearly completed, and many other areas of work involving the main control panel and interconnecting cabling has proceeded routinely. (Author)

25. PHYSICS

AD-402 587 Div. 25
(TISTP/MC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
UKRAINIAN JOURNAL OF PHYSICS (SELECTED ARTICLES).
4 Apr 63, 13p.
FTD TT63 88

Unclassified report

Trans. from Ukrains'kiy Fizichniy Zhurnal, 7:1, pp. 73-74, 79-81, 83-86, 1962.

Descriptors: *Physics, *Low-pressure research, *Adsorption, *Plasma physics, Chromium, Vacuum apparatus, Gases, Magnetic fields.

Contents:
Obtainment of ultrahigh vacuum with the aid of chromium, dispersed by electron bombardment
Certain characteristics of partial adsorption of components of residual gases at very high vacuum. II
Effect of electrostatic instabilities on the function of distribution of the beam, which reacts with plasma in magnetic field

AD-402 605 Div. 25
(TISTP/MFA) OTS price $3.60

Block Associates, Inc., Cambridge, Mass.
DEVELOPMENT OF A ROCKET-BORNE INFRARED SPECTROMETER EMPLOYING THE PRINCIPLES OF MOCK INTERFEROMETRY,
by Niels O. Young, Lawrence Mertz, and John Armitage. 16 Jan 63, 1v. BAI SR 4
Contract AF19 604 5738, Task 49045
AFCRL63 234

Unclassified report

Descriptors: *Interferometers, *Spectroscopy, Spectrum analyzers, Diffraction gratings, Simulation, Fourier analysis, Wave transmission, Infrared radiation, Ultraviolet radiation, Optical images, Design, Instrumentation, Emissivity, Rockets, Airborne.

A rocket-borne infrared spectrometer employing the principles of mock interferometry is described. Development work centered around two main problems: (1) Design of a mechanical drive unit that would yield a ''linear'' reticle drive; (2) Design of an optical correction system to correct the field curvature produced by off-axis rays. The first of these problems was eventually solved but no good solution to the second problem was discovered. The off-axis imaging problem can be ameliorated by using small entrance and exit apertures, but this limits throughout and resolution. The problem is not felt to be inherently insoluble and further work to devise an optical correction system is recommended. (Author)

AD-402 616 Div. 25
(TISTP/TL) OTS price $4.60

General Dynamics, Fort Worth, Tex.
A MONTE CARLO MULTIBEND DUCT PROCEDURE,
by D. G. Collins. 15 Sep 62, 45p. 62 13T; MR N297
Contract AF33 657 7201, Task I

Unclassified report

Descriptors: *Monte Carlo method, *Duct bends, *Gamma rays, *Neutron scattering, Integral equations, Series, Sampling, Experimental data, Penetration, Intensity.

A Monte Carlo procedure was developed to evaluate the energy, angular distribution, and intensity of either the scattered neutron or gamma-ray flux that penetrates a multibend duct. A detailed presentation of the Monte Carlo method as an approximation to the Neumann series solution of the integral transport equation is given. Sampling techniques utilized by the procedure are described. Included in these techniques are splitting, Russian Roulette, statistical estimation, and a method of biasing the sampling from the source angular distributions. Results obtained with the procedure are compared with the data taken in the duct penetration and systemization experiment. (Author)

AD-402 680 Div. 25
(TISTP/MFA) OTS price $3.60

Columbia U., School of Engineering, New York.
GUIDED ELECTROMAGNETIC PROPAGATION ALONG A NON-GYROTROPIC CIRCULAR PLASMA COLUMN,
by V. L. Granatstein and S. P. Schlesinger.
30 Oct 62, 34p. 23-62; SR 77
Contract AF19 604 3879, Proj. 4600
AFCRL 63-10

Unclassified report

Descriptors: *Plasma physics, *Electromagnetic waves, Plasma oscillations, Magnetic properties, Magnetic fields, Polarization, Propagation, Tensor analysis, Bessel functions, Resonance, Electron density, Waveguides, Vibration.

Guided electromagnetic modes along a homogeneous circular column of plasma imbedded in free space are examined for the two extreme cases of zero and large axial magnetic field. The plasma is assumed to be cold and collisionless and ion motion is neglected. The assumptions made are approximated by certain laboratory plasmas and hence the results may be of practical importance. For the zero field case the modes with azimuthal variation are found under certain conditions to exhibit backward wave characteristics and previously published results of a quasi-static analysis are modified. In the case of large magnetic field, the occurrence of unique waveguiding features is discussed. (Author)

AD-402 708 Div. 25, 4, 17
(TISTE/CAM) OTS price $1.25

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
RULES FOR THE OCCURRENCE OF SUPERCONDUCTIVITY AMONG THE ELEMENTS, ALLOYS, AND COMPOUNDS,
by Gerhart K. Gaule. Jan 63, 40p. TR2329
DA Task 3A99 25 003 01

Unclassified report

Descriptors: *Superconductivity, Superconductors, Alloys, Transition elements, Transition temperature, Atomic properties, Borides, Carbides, Nitrides, Metals, Theory.

An empirical rule predicting the occurrence of superconductivity among the elements was given by Matthias (Matthias Rule, MR). The MR states that nonmetallic, ferromagnetic, and antiferromagnetic elements do not become superconductors, and that the empirical laws applying to the transition metals (TM) are quite different from those applying to nontransition metals. Within these restrictions, the MR gives an estimate of the expected superconducting transition temperature, Tc, in terms of three parameters: (1) the atomic mass, M; (2) the atomic volume Vm,

and (3) the number of valence electrons per atom, n. The crystal symmetry also has some influence on the Tc value. The MR for the elements is with success applied also to alloys and compounds, when proper averages over the M and n values of the constituent atoms are used. Three supplementary rules pertaining to the influence of compound formation on Tc are given by the author. The theoretical justification for the established empirical rules is outlined. Certain characteristic deviations from the MR are then discussed. A new rule is proposed for systems which contain TM atoms in the form of chains, or prisms, such as the TM borides. In other systems not obeying the MR, unexpectedly large changes of Tc are caused by small concentrations of vacancies, or of impurity atoms. Systems not obeying the MR should be of special importance for the development of new superconducting materials. (Author)

AD-402 728 Div. 25
(TISTP/AW) OTS price $1.10

Ministry of Aviation (Gt. Brit.).
ANALYSIS OF CRITERION RELATIONSHIPS FOR LIQUIDS BOILING IN TUBES. (UTOCHENIE KRITERIAL'NYKH ZAVISIMOSTEI PRI KIPENII ZHIDKOSTEI V TRUBAKH,
by I. I. Sagan'. Apr 63, 9p. TIL/T5388
Unclassified report

Trans. from Izv. Vyssh. Uchebn. Zavedenii, Energetika, 5, pp. 108-114, USSR, 1959.

Descriptors: *Boiling, *Heat transfer, Solutions, Sucrose, Liquids, Viscosity, Pipes, Equations of State.

A study was made of the heat exchange process in boiling highly concentrated sugar solutions with natural circulation and interchangeable heating tubes of 159/150, 95/87 and 57/48 mm in diameter, the sugar content being 0, 60, 75, 82 and 86%, the pressure varying from 0.4 to 1.0 atm. abs. with a depth of immersion of the heating surface of up to 200%. The experiments, carried out for a sufficiently wide range of variations of kinematic viscosities, allowed of ascertaining the effect of the viscosity on the heat transfer coefficient and of determining the values of the Ga and Pr power indices in the M. A. Kichigin-N.Y. Tobilevich and in the V.I. Tolubinskii criterial systems. The new experimental data made it possible to obtain a corrected criterion equation for the M.A. Kichigin-N.Y. Tobilevich system and a corrected criterion formula for the V.I. Tolubinskii system, and to extend the applicable range of these formulae for Prandtl numbers ranging from 0.7 to 1540. Since the M.A. Kichigin-N.Y. Tobilevich corrected criterion system yields a smaller error in generalising experimental data relating to a large group of experimental substances and is valid in a wide variational range of factors affecting the heat transfer in boiling liquids, its application should be given preference, at least at the present stage of progress, in the study of the heat exchange processes in boiling. (Author)

AD-402 784 Div. 25, 9
(TISTP/JW) OTS price $1.60

Michigan State U., East Lansing.
ANTIFERROMAGNETIC BEHAVIOR IN SINGLE CRYSTALS.
Final rept. 1 Jan 61-31 Mar 63,
by R. D. Spence and H. Forstat. 31 Mar 63, 15p.
Contract Nonr2587 03
Unclassified report

Descriptors: *Antiferromagnetism, Nuclear magnetic resonance, Low temperature research, Heat, Magnetic fields, Single crystals.

Work carried out by the nuclear resonance technique and by specific heat studies is outlined. Each of these techniques has contributed information about both the antiferromagnetic state and the antiferromagnetic transition. However, in the case of nuclear magnetic resonance, the principal contribution seems to have been in providing information about the antiferromagnetic state, while in the case of the specific heat work, the information it provides is largely concerned with the antiferromagnetic transition. (Author)

AD-402 803 Div. 25
(TISTP/MC) OTS price $5.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ATLAS OF SCATTERING DIAGRAMS FOR N = 1.5,
by Rudolf B. Penndorf. Nov 62, 51p. SR10; TR63 9
Contract AF19 604 5743
AFCRL 62 1131
Unclassified report

Report on Research on Aerosol Scattering in the Infrared.

Descriptors: *Aerosols, *Scattering, Infrared radiation, Refractive index, Functions, Mathematical analysis.

Angular scattering diagrams are constructed for spherical aerosols of refractive index n = 1.5. They show the intensity functions i sub 1, i sub 2, and i sub 1 plus i sub 2 as functions of the scattering angles for size parameters alpha = 0.5 (0.5)10. The basic data have been computed using Mie's theory, and a graphical interpolation technique (altitude-chart technique) has been used to determine accurately the position and numerical value of the maxima and minima. The scattering diagrams presented in this atlas allow to determine the intensity functions i sub 1, i sub 2, and i sub 1 plus i sub 2 for any desired scattering angle with a high degree of reliability. The basic data limit the construction of reliable scattering diagrams to alpha less than 10. (Author)

AD-402 809 Div. 25
(TISTM/AW) OTS price $2.60

Institute of Flight Structures, Columbia U., New York.
UPPER AND LOWER BOUNDS IN PROBLEMS OF MELTING OR SOLIDIFYING SLABS,
by Bruno A. Boley. Oct 62, 24p. 23 62; TR23
Contract Nonr266 20, Proj. NR064 401
Unclassified report

Descriptors: *Melting, *Thermal conductivity, Differential equations, Solids, Surface properties, Functions, Mathematical analysis.

The problem studied is that of a slab, heated in an arbitrary manner on one face and insulated on the other, which melts (or solidifies), the material being allowed to remain stationary after change of phase. Variable material properties are taken into account. After preliminary general considerations, it is shown that the solution to the stated problem is unique. It is then proved that higher rates of melting and higher

temperatures will result from certain combinations of the magnitude of the applied heat input and of a fictitious heat source traveling with the solid-liquid interface. From this result a method is developed for the construction of upper and lower bounds to the solution of the problem; an example is also presented. It is also shown that, under the same arbitrary heat input, the rate of melting in the present problem is always lower than that in the companion problem in which the material is instantaneously removed after change of phase. (Author)

AD-402 896 Div. 25
(TISTP/MC) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
CURRENT FLOW BETWEEN ELECTRODES IMMERSED IN A LOW GAS PRESSURE PLASMA,
by M. J. Kofoid. 6 Mar 63, 38p. D1 82 0238
Unclassified report

Also available from the author.

Descriptors: *Gas ionization, *Ionic current, Electric currents, Electrodes, Plasma physics.

When electrodes are immersed in a low-density gas plasma, breakdown in the ordinary practical sense cannot occur with an applied voltage less than the minimum of Paschen's curve. However, a leakage current can flow. The maximum circuit current will be numerically equal to the saturation positive ion current which flows from the plasma to the cathode. Attention is centered on the situation where one electrode has an area very much larger than the other. The difference in leakage current, as polarity is reversed, is then striking. The theory is discussed. The effects on the current vs voltage characteristics of changing the electrode area, electrode-area ratio, plasma ionization density, gas density, and gas were investigated experimentally. Practical expedients can greatly decrease the leakage current. (Author)

AD-402 906 Div. 25
(TISTP/GRW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
IMPROVED HIGH MASS RANGE RESOLUTION WITH AN OMEGATRON MASS SPECTROMETER.
Research rept.,
by J. H. Bloom, C. E. Ludington, and R. L. Phipps. Oct 62 17p.
AFCRL 62 953
Unclassified report

Presented at the Sixth National Conference on Tube Techniques, September, 1962, Advisory Group on Electron Devices, Office of the Director of Defense Research and Engineering, New York City.

Descriptors: *Mass spectroscopy, *Krypton, *Spectrum analyzers, Resolution, Sensitivity, Xenon, Magnetic fields, Isotopes.

The influence of changing the magnetic field on the resolution and sensitivity of the omegatron mass spectrometer is shown for krypton. Good resolution may be extended through the mass range of the xenon isotopes (mass number 136) by carefully selecting the operating parameters of the omegatron. The resolution is plotted against the magnetic field strength for Kr(84+), and follows the theoretical predictions within experimental error. The effect of varying the other parameters of the omegatron with krypton is shown and discussed. A summation of the work with xenon is also given. (Author)

AD-402 925 Div. 25
(TISTP/MC) OTS price $1.60

Syracuse U., N. Y.
IMPURITY STATES ASSOCIATED WITH SUBSIDIARY ENERGY-BAND MINIMA.
by Harvey Kaplan. 1962, 17p.
Sponsored by Air Force Office of Scientific Research
Unclassified report

Descriptors: *Solid state physics, *Semiconductors, Impurities.

Two results have been established concerning the existence of localized electronic states associated with a point impurity in a substance having a spherical energy band, E(k) = epsilon sub 0 + epsilon sub 1 x cosk + epsilon sub 2 cos2K, where k = k, with a subsidiary minimum at k = 0. The 1st result is a generalization of Slater and Koster's result, that in 1 dimension an energy band with a subsidiary minimum has no localized states associated with this minimum if the impurity potential is of the 4elta-function type; i.e., it has only 1 matrix element between Wannier functions, a diagonal one referring to 1 site. We show that this result also holds for a spherical band in 3 dimensions. Out 2nd result is that, for the Coulomb-impurity potential screened by the static dielectric constant, and the above spherical band, there are hydrogen-like localized states built out of states near the subsidiary minimum, even when all powers of k in E(k) are taken into account in the equation for the envelope function. The deviation of the impurity potential from slow variation causes a long lifetime for decay of the localized state into conduction states of the same energy. For a typical shallow impurity state, the lifetime is approximately equal to 10 to the -8th to 10 to the -9th power sec. (Author)

AD-402 926 Div. 25
(TISTP/MC) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
ELASTIC VIBRATIONS OF PARABOLOIDAL SHELLS OF REVOLUTION,
by W. H. Hoppmann II, M. I. Cohen, and V. X. Kunukkasseril. Apr 63, 18p.
Contract DA30 115 509ORD912
Unclassified report

Descriptors: *Bodies of revolution, *Vibration, Elasticity, Membranes, Stresses.

This report presents a discussion of the theory of vibration of a paraboloidal shell of revolution. The theory is that which is usually associated with the work of A. E. H. Love. Observations are made concerning the equations of motion which include both flexural and membrane stresses those which relate to flexural and membrane stresses for shallow shells, and finally those which apply to membrane stresses only. Results are also presented for an extensive experimental study of the vibrations of two models of thin paraboloidal shells. (Author)

AD-402 932 Div. 25, 4
(TISTM/AMS) OTS price $2.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE,
by C. N. Bliven and T. G. Polanyi. 31 Dec 62, 17p. TR62 255.3; SR3
Contract AF19 628 331, Proj. 4619, Task 461901
AFCRL 63 86
Unclassified report

Descriptors: *Tungsten, *Molybdenum, *Adsorption, *Gases, Solids, Experimental data, High temperature research, Work functions, Mathematical analysis, Nitrogen, Oxygen, Surfaces, Low pressure research.

An investigation of the interaction of nitrogen with a hot tungsten filament showed that a chemical pumping effect occurs. The magnitude of this effect and its variation with temperature is discussed. Preliminary results on the study of the effect of adsorbed oxygen on the work function of molybdenum at room temperature indicated that there are three stages in the adsorption process: during the first two stages, there is a rapid increase in the work function, whereas in the last stage there is a small increase and very slow rate of rise in work function. (Author)

AD-402 937 Div. 25
(TISTP/FEM) OTS price $3.60

Mitre Corp., Bedford, Mass.
DYNAMIC STRESSES AND DISPLACEMENTS AROUND CYLINDRICAL DISCONTINUITIES DUE TO PLANE SHEAR WAVES,
by C. C. Mow and L. J. Mente. 1 Nov 62, 33p.
SR70
Contract AF33 600 39852, Proj. 607
ESD TDR62 296
Unclassified report

Descriptors: *Mathematical analysis, *Mechanical waves, Elasticity, Shear stresses, Cylindrical bodies, Reflection, Equations, Functions, Integral equations, Bessel functions, Stresses.

The problem of dynamic stresses and displacements around a cavity and rigid inclusion of arbitrary density is examined for an elastic medium during the passage of a plane shear wave. In the cavity case, the dynamic stresses and displacements are found to be dependent upon the incident wave number and Poisson's ratio of the medium. In the rigid inclusion case, it is found that dynamic stresses and the rigid body rotation and translation are dependent upon the incident wave numbers, the Poisson's ratio, and the density ratio of the medium and the insert. Close coupling is observed between the stresses and the rigid body motion of the insert. (Author)

AD-402 997 Div. 25
(TISTP/FR) OTS price $3.00

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF A SUITABLE ANECHOIC TREATMENT FOR THE ASD SONIC FATIGUE FACILITY.
Final rept. Nov 61-Apr 62,
by Franklin G. Tyzzer. Mar 63, 138p.
Contract AF33 657 7434, Proj. 4437
ASD TDR62 985
Unclassified report

Descriptors: *Acoustic insulation, Anechoic chambers, Isocyanate plastics, Expanded plastics, Sound, Absorption, Sound generators.

The design of an anechoic treatment for the test chamber of the ASD high intensity sound facility is discussed. The acoustical requirements for 96% absorption coefficient at normal incidence for a frequency range of 50 - 7000 cps and for sound pressure levels up to 160 db and the mechanical requirements for a collapsible treatment presented novel problems in design. The requirements were met by a treatment, six feet thick, composed of six layers of absorbing material irregularly spaced with the acoustical resistances per layer increasing from values for layers at the incidence sound side to higher values for layers near the room surfaces. Tests in the high intensity impedance tube facility designed for the program showed that the normal incidence absorption coefficient of the treatment was 96% or higher over most of the frequency range from 50 - 7000 cps at sound pressure levels from 130 to 160 db. Fairly satisfactory results were also obtained for a five layer treatment subsequently designed. Etched polyurethane foam supported by wire screens was initially chosen as the layer material because of its resistance to damage in small scale life tests at particle velocities corresponding to a sound pressure level of 160 db. In subsequent accelerated life tests in the siren facility, there was no significant damage to a four by four foot specimen of material after 105 hours at sound pressure levels between 165 and 170 db except for failure of the supporting wire screens at about 78 hours. (Author)

AD-403 001 Div. 25
(TISTP/MC) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
STABILITY AND RESPONSE OF CYLINDRICAL SHELLS TO MOVING LOADS,
by John P. Jones. 15 Mar 63, 24p. TDR169 3153 10TN1
Contract AF04 695 169
BSD TDR63 35
Unclassified report

Descriptors: *Cylindrical bodies, Damping, Vibration, Loading, Stability.

The stability of a circular cylindrical shell subjected to a moving ring load with a constant velocity was examined in detail when both longitudinal and transverse inertia effects are included, using both the Timoshenko and the Flugge equations. A lower resonance speed has been found, which apparently has been concealed in a recent paper. (Author)

AD-403 011 Div. 25
(TISTP/MFA) OTS price $1.10

Electronics Research Lab., U. of Calif., Berkeley.
PHOTODISSOCIATION OF MOLECULES FOR EXCITATION OF AN OPTICAL MASER,
by J. R. Singer. 8 Jan 62, 7p. 60; 429
Contract AF49 638 102
AFOSR 2251
Unclassified report

Descriptors: *Lasers, *Molecules, Photons, Molecular beams, Atoms, Emissivity, Iodides, Bromides, Chlorides, Excitation, Dissociation.

AD-403 127 Div. 25, 15
(TISTP/MFA) OTS price $5.60

Electrical Engineering Research Lab., U. of Texas, Austin.
GENERAL DISPERSION RELATIONS FOR A PARTIALLY-IONIZED GAS,
by C. E. Prince, Jr. and F. X. Bostick, Jr.
28 Feb 63, 45p. 129
Contract Nonr375 14, Proj. NR371 032/3 27 61
Unclassified report

Descriptors: *Gas ionization, *Determinants, *Plasma physics, Simultaneous equations, Perturbation theory, Hydrodynamics, Electro-

magnetic waves, Magnetohydrodynamics, Numerical analysis, Attenuation, Propagation, Velocities, Pressure, Scattering, Plasma oscillations, Magnetic fields, Equations.

Beginning with Boltzmann's equation and the equation of momentum transfer for a partially-ionized gas, seven basic equations are derived for small-amplitude perturbations. These are used to obtain a determinant whose eigenvalues identify five modes of propagation in the most general case. A steady magnetic field and an arbitrary direction of propagation with respect to this field is supposed, and the complications introduced by this general approach are examined by a brief study of simpler cases. It is shown that only by means of a high-speed electronic computer may attenuation factors and phase and group velocities be accurately determined. This paper surveys work done by other investigators, includes the approach taken by a research group at the Electrical Engineering Research Laboratory which has access to the Control Data Corporation 1604 Computer, and is only to be considered preliminary to later presentation of computer results. (Author)

AD-403 130 Div. 25
(TISTP/MFA) OTS price $4.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
ELECTRON INJECTION LASER.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by R. W. Keyes, G. J. Lasher, and K. Weiser.
28 Feb 63, 41p.
Contract DA36 039sc90711
Unclassified report

Descriptors: *Lasers, *Diodes (Semiconductors), Electroluminescence, Indium compounds, Phosphides, Semiconductors, Gallium compounds, Arsenides, Diffusion, Zinc, Manganese, Electrons.

Indium phosphide technology has been developed to the point where current densities approaching 10 to the 5th power amp/sq cm can be passed through electroluminescent diodes. Evidence of stimulated emission (narrowing of the emitted line by a factor of 1.5) has been observed in some of the diodes at high current densities. The electroluminescence of double diffused (Zn-Mn) GaAs diodes was investigated at high currents. No line narrowing was observed. The nature of p-n junctions in GaAs lasers is influenced by the anomalous nature of zinc diffusion in GaAs. The concentration dependence of the zinc diffusion constant in GaAs is known to be the of form D equivalent to ac squared where c is the concentration of zinc. This behavior suggests a substitutional-interstitial mechanism for diffusion. The magnitude of the proportionality constant a and its temperature dependence have been compared with Theory. The comparison provides strong evidence for the substitutional-interstitial diffusion mechanism. (Author)

AD-403 133 Div. 25
(TISTP/JEA) OTS price $1.60

Linde Co., Div. of Union Carbide Corp., East Chicago, Ind.
RUBY IMPROVEMENT FOR LASERS TASK 1.
Quarterly progress rept. no. 3, 1 Nov 62-31 Jan 63,
by R. L. Hutcheson. 31 Jan 63, 22p.
Contract DA36 039sc89089, DA Proj. 3A99 21 001, Task 1
Unclassified report

Descriptors: *Lasers, *Crystal growth, Crystal Structure, Powders, Flames, Thermal diffusion, Additives, Ruby.

The effects of growth rate and the addition of fluxing agents to starting powders on the growth of ruby are discussed. Growth data on two lots of ruby crystals are presented. (Author)

AD-403 137 Div. 25, 32
(TISTP/MFA) OTS price $9.10

Autonetics, Downey, Calif.
A SURVEY OF LITERATURE ON TECHNIQUES AND INSTRUMENTATION FOR MEASURING ELECTRICAL PULSE INTERVALS,
by Barbara Ann Bryce and Sarah Ann Alevizon.
28 Feb 63, 1v. EM1163 106
Unclassified report

Descriptors: *Electromagnetic pulses, *Bibliographies, Abstracts, Measurement.

This bibliography is on rise time and width range of very short electrical pulses. Emphasis has been placed on how to measure time and peak amplitude by accurate nanosecond measurements. Special equipment and techniques are cited. The scope covers approximately a 12-year period with most of the literature encompassing the last four years. (Author)

AD-403 264 Div. 25, 30
(TISTM/PCR) OTS price $1.00

Metals Research Lab., Brown U., Providence, R. I.
ULTRASONIC METHODS IN THE STUDY OF FATIGUE AND DEFORMATION IN SINGLE CRYSTALS OF ALUMINUM AND SODIUM CHLORIDE.
Rept. for Dec 60-Dec 61,
by Bruce Chick, Akira Hikata, George Anderson, William Findley, Charles Elbaum and others.
Feb 63, 31p.
Contract AF33 616 6945, Proj. 7360, Task 736002
ASD TDR62 186
Unclassified report

Report on Research to Investigate the Use of Ultrasonic Methods in the Study of Deformation and Fatigue in Materials.

Descriptors: *Single crystals, Aluminum, Sodium compounds, Chlorides, Stresses, Velocity, Damping, Tensile properties, Instrumentation, Ultrasonic radiation, Attenuation, Fatigue (Mechanics), Crystal structure, Test methods, Test equipment, Deformation.

The use of ultrasonic methods for studying defect formation and its consequences in connection with stress cycling and deformation in aluminum and sodium chloride single crystals is the subject of this report. The observed ultrasonic changes appeared closely associated with changes in dislocation behavior. To establish this deformation experiments were used in such a way that results could be related to the behavior of the slip systems and to their orientation. Aluminum single crystals were used for these experiments. Simultaneous measurements of attenuation and velocity changes were made continuously during tensile deformation. In the very early stages of deformation, for all orientations, an increase in attenuation is observed before microscopic yield. Easy glide is observed by the attenuation and velocity changes. Measurements in tension have been made for the purpose of comparing the dislocation damping and pinning effects in an ionic crystal with those in a metal. Important equipment improvements have been made for automatic recording of attenuation and velocity measurements. (Author)

AD-403 369 Div. 25, 8
(TISTP/MFA) OTS price $2.50

RCA Defense Electronic Products, Moorestown, N. J.
ELECTRODELESS MHD GENERATOR RESEARCH, PART II, LABORATORY FACILITY AND EXPERIMENTAL RESULTS.
Final rept., 26 Apr 61-31 Jan 63,
by J. F. Delany, J. B. Fanucci, C. A. Nittrouer, H. C. Petty, and N. Sands. Mar 63, 109p.
Contract AF33 616 7913, Proj. 8173, Task 817306 7
ASD TDR62 411, pt. 2
Unclassified report

Descriptors: *Magnetohydrodynamics, *Power equipment, Generators, Feasibility studies, Generators, Supersonic nozzles, Plasma jets, Analysis, Tests, Design.

The problem was to experimentally determine the feasibility of AC Electrodeless Magnetohydrodynamic Power Generation, utilizing a model generator. The analysis, development, and test model operation involved the design, construction, and testing of the component units which comprise the plasma arc lab facility. The lab facilities provided for the conduction of the experimental investigation and the design of the generator test model, which involved Plenum and Mixing Chamber, Seeder, Supersonic Nozzle, Test Section, Diffuser, Power Extraction Coils, Coil Power Supply, Phase Nulling Network, and other instrumentation. Electrodeless AC MHD power generation was experimentally observed, and extracted power from the plasma recorded during test operation of the model. (Author)

AD-403 374 Div. 25, 8
(TISTP/JW) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
LONG LINE EFFECT IN CONNECTION WITH CAVITY RESONANCES,
by H. M. Altschuler. 17 Apr 63, 12p. 1148 63
Grant AFOSR62 295
Unclassified report

Descriptors: *Cavity resonators, Frequency shift, Reflection, Wave transmission, Transmission lines, Resonance.

When resonant cavities are separated from relatively small obstacles by long waveguides, either multiple resonances or resonant frequency shifts may occur. This long-line effect is explored for both transmission and reflection cavities and is found to be much more serious in the former than in the latter case. It can usually be eliminated by matching procedures. (Author)

AD-403 392 Div. 25
(TISTP/FR) OTS price $4.60

General Dynamics/Astronautics, San Diego, Calif.
HIGH TEMPERATURE EMISSIVITIES OF THE 2.7 MICRON BAND OF H2O BETWEEN 1000 K AND 2200 K,
by Carmine C. Ferriso and Claus B. Ludwig.
Apr 63, 46p. BBE63 002
Contract Nonr3902 00
Unclassified report

Descriptors: *Water vapor, Emissivity, Infrared radiation, Combustion chambers, Spectrum analyzers.

Spectral emissivities between 2800 and 4200 waves per centimeter were obtained for water vapor at 1000, 1200, 1500, 1800 and 2200 K. The heated H2O test gas was produced at the exit of a small rocket burner which used H2 and O2 propellants. The emission measurements of the gases were made at the immediate exit of the burner where the composition, total pressures and temperature can be defined. The emissivities or absorptivities were calculated from a calibrated emission spectrum and an accurate spectroscopic determination of the temperature of the test gas. The composition of H2O was evaluated from a semi-empirical fit to a thermo-chemical flow calculation. The hot H2O samples were observed at a total pressure of one atmosphere in the optically thin region where the spectral emissivities are on the average approximately 0.05. The variation of the spectral emissivities of H2O in the 2.7 micron region as a function of temperature are given for a constant amount of H2O in the optical path. A good estimate of the integrated intensity of the 2.7 micron H2O band (nu sub 1 and nu sub 3) was made from the high temperature data. (Author)

AD-403 410 Div. 25
(TISTM/ODN) OTS price $4.60

Noyes Chemical Lab., U. of Illinois, Urbana.
AN NMR STUDY OF THE ALKALI HEXAFLUOROPHOSPHATES' DYNAMIC STRUCTURE,
by Gerald R. Miller and H. S. Gutowsky.
16 Mar 63, 44p. TR62
Contract Nonr1834 13, Proj. NR051 215
Unclassified report

Descriptors: *Alkali metal compounds, *Phosphates, *Nuclear magnetic resonance, Fluorides, Sodium compounds, Cesium compounds, Potassium compounds, Rubidium compounds, Ions, Salts, Crystal structure, Low temperature research, Absorption.

The fluorine nuclear magnetic resonance spectra of the sodium, potassium, rubidium and cesium hexafluorophosphates were studied between 77 and 400 K. In each of the salts the PF6(-) ions are reorienting about the octahedral axes at random or nearly so for temperatures of 200 K and above. The broadening of the fluorine resonance in these solids at lower temperatures indicates that the ease with which the PF6(-) groups reorient increases with increasing size of the alkali metal cation, so that for CsPF6 the fluorine resonance is still narrow at 77 K. A quantitative study of the potential barriers to PF6(-) group reorientation was discouraged by the discovery that the fluorine line shapes and widths are remarkably sensitive to the physical state and in the case of RbPF6 the thermal history of the sample. Fluorine line shape studies reported previously for solid CF4 are reinterpreted in terms of a similar two-phase cooperative process for the freezing out of the CF4 reorientations. (Author)

AD-403 436 Div. 25
(TISTP/WH) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
POSITIVE-COLUMN STRIATIONS IN GASEOUS CONDUCTORS,
by B. E. Dobratz. 19 June 62, 26p. SR19; S60, I454
Contract AF19 628 324, Proj. 5634, Task 563402
AFCRL 63 25
Unclassified report

Descriptors: *Plasma oscillations, *Plasma physics, *Electron tubes, Gases, Mercury, Hydrogen, Helium, Vapors, Gas discharges.

The positive column in certain gaseous conductors was examined by external electrostatic probe pickup, by photoelectric signal pickup, and by rotating mirror images for time-periodic oscillations and space-periodic striations. Mercury vapor with dc excitation gave moving positive striations (motion away from anode) of large amplitude with a velocity of about 50 meters per second. No direct observational evidence of negative striations was found, contrary to what has been reported by some authors, but there was some indirect evidence of weak negative striations. No stationary striation pattern was found in mercury vapor with dc excitation. Mercury vapor with ac excitation gave pronounced stationary striations, which were found to be the optical result of cyclic motion of a sequence of moving positive striations. Ultrapure hydrogen and helium were examined. No oscillation or striation phenomena were found in these gases with the exception of a pronounced stationary striation pattern in ultrapure hydrogen under dc excitation. (Author)

AD-403 437 Div. 25
(TISTP/MFA) OTS price $4.60

Electronics Research Lab., U. of Calif., Berkeley.
BEHAVIOR OF THE SPACE CHARGE IN A PLASMA MAGNETRON.
by Y. Ikeda. 15 June 62, 38p. SR17, S60, I433.
Contract AF19 628 324, Proj. 5634, Task 563402
AFCRL 63 41
Unclassified report

Descriptors: *Magnetrons, *Plasma physics, Anodes (Electron tube), Cathodes (Electron tubes), Plasma sheath, Secondary emission, Capacitance, Probes (Electromagnetic), Gas discharges, Noise (Radio), Measurement, Instrumentation, Tests, Electron beams, Space charges, Electron tubes.

An analytical and experimental investigation of plasma magnetrons with smooth-bore anodes is described. Secondary-emission yield of several materials is investigated and the region in which limiting anode currents are obtained is related to the operation of conventional magnetrons. Basic phenomena caused by Philips-ion-gage discharge particles are described, with particular emphasis on the sheath region. The phenomena underlying the build-up of anode current are elucidated. (Author)

AD-403 469 Div. 25, 9, 14, 32
(TISTM/ODN) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMAL SHOCK: AN ANNOTATED BIBLIOGRAPHY,
comp. by Scott J. Buginas. Sep 62, 20p. 8 19 62 4; SB62 39
Unclassified report

Descriptors: *Bibliographies, *Thermal stresses, Fatigue (Mechanics), Stability, Theory, Refractory materials, Ceramic materials, Shock (Mechanics), High temperature research.

The search made began with the literature of 1956. Glenny in 1961 and Majors in 1957 have written extensive review articles concerning thermal fatigue. Some of the references of these authors apply directly or are related to the subject of this bibliography. This search was oriented toward aiding researchers in developing a definition for thermal shock (there are conflicts in the literature) and in studying thermal shock vs. fatigue cycling. (Author)

AD-403 474 Div. 25, 8
(TISTE/CRJ) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
MICROWAVE PHONON GENERATION BY THIN MAGNETIC FILMS,
by Marden H. Seavey, Jr. Feb 63, 21p.
Proj. 4600
AFCRL63 57 Unclassified report

Descriptors: *Phonons, *Magnetostrictive elements, Magnetostriction, X band, Magnetic fields, Direct current, Single crystals, Green's function, Quartz, Films, Ferromagnetic materials, Resonance absorption, Microwave frequency.

The magnetostrictive generation of microwave phonons by thin magnetic films is theoretically described and experimental data taken at X-band are discussed. The cases of generation on the uniform precession on ferromagnetic resonance (FMR) and on spin-wave resonance (SPWR) are treated. Wave equations are obtained for the displacement components when the dc magnetic field makes an arbitrary angle with the film normal. These have driving terms proportional to dm/dy which are responsible for the phonon generation. It is shown that in the FMR case the generation occurs at the film surfaces, while in the SPWR case the generation takes place throughout the film interior. The experimental data appear to support the generation model in the FMR case, but unexplained discrepancies exist between theory and experiment in the SPWR case. A comparison with quartz piezoelectric generation is made, and while the generation efficiencies are about equal, substantial improvement is possible in the magnetostrictive case. (Author)

AD-403 492 Div. 25, 2
(TISTP/MFA) OTS price $1.60

Isomet Corp., Palisades Park, N. J.
RESEARCH ON A SUITABLE DISPERSING OR ANALYZING CRYSTAL FOR X-RAY SPECTROSCOPY.
Final rept. 15 Dec 61-14 Dec 62,
by Warren Ruderman, Edward Losin, and Dudley Uphoff. Apr 63, 14p.
Contract AF33 657 7756, Proj. 7364, Task 736405
ASD TDR63 311
Unclassified report

Descriptors: *X-ray diffraction analysis, *Crystal growth, Synthesis, Solutions, Powders, Diffraction analysis, Crystal structure, Single crystals, Organic compounds, Reflection, Spectroscopy, Spectrum analyzers, Instrumentation, Laboratory equipment, Fluorescence, X-ray spectroscopy.

A large number of potential compounds were investigated for application as X-ray analyzer crystals with 2d spacings from 25 to 100A. Four crystals with 2d values from 31 to 90A were developed and show exceptional promise. Although large crystals of these compounds were not grown, X-ray analysis of small crystals indicated excellent reflectivities. (Author)

26. PRODUCTION AND MANAGEMENT

AD-402 591 Div. 26, 27
(TISTE/OHD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT POWER ENGINEERING (SELECTED ARTICLES).
2 Apr 63, 21p.
FTD TT63 81
Unclassified report

Trans. from Teploenergetika, No. 8, pp. 47-51, 51-55, 1962.

Descriptors: *Gas turbines, *Compressor blades, Periodicals, Gas flow, Effectiveness, Theory, Dynamics, Measurement, Experimental data, Test methods, Design, Stresses.

Experimental data are given on the testing of gas turbine stages with cylindrical boundaries of flow-through and D/1 = 4.8. A comparison was made with the testing calculations using simplified and inverse equations of radial equilibrium. It was shown, that the divergences between experimental and calculated data are due to final phenomena and the flow through. Also described are studies of pressure pulsations and the dynamic stresses of axial compressor vanes caused by them. The investigations were conducted by the tensometric sounding method. The condition at which the phenomenon of rotating flow separation takes place, was investigated. (Author)

AD-402 679 Div. 26, 14, 17
(TISTM/PCR) OTS price $5.60

Bendix Corp., Eatontown, N. J.
CERAMIC TO METAL SEALS FOR HIGH-TEMPERATURE THERMIONIC CONVERTERS.
Quarterly technical rept. no. 2, 1 Jan-31 Mar 63.
15 Apr 63, 52p. RBES03404 2
Contract AF33 657 10038 Proj. 8173 Task 817305
Unclassified report

Descriptors: *Thermionic converters, *Seals (Stoppers), High temperature research, Bonding, Refractory materials, Alloys, Composite materials, Metal coatings, Brazing, Electron beams, Welding, Ultrasonic radiation, Electroforming, Diffusion, Oxides, Thermal stresses, Heating, Cooling, Cesium, Compatibility, Corrosion, Metals, Manufacturing methods, Ceramic materials.

This report covers work to develop improved ceramic to metal seals for use in thermionic converters. The objective of this program is to develop seals which are capable of long life at 1500 C in cesium and vacuum environments, and to extend the sealing techniques developed to materials which are capable of long life at temperatures in excess of 1500 C. Studies are being performed to develop improved methods of sealing both metallized and unmetallized ceramic members to refractory metals. Associated work on ceramics, refractory metal alloys and ceramic-metal composites to provide useful base material characteristics will be carried on as the requirements of the project may dictate. (Author)

AD-402 686 Div. 26
(TISTE/JBM) OTS price $2.60

Rotron Manufacturing Co., Woodstock, N. Y.
THE DEVELOPMENT OF GAS LUBRICATED BEARINGS FOR USE IN BLOWER MOTORS.
Interim development rept., 7 Dec 62-7 Mar 63, 7 Mar 63. 24p.
Contract NObsr87522
Unclassified report

Descriptors: *Journal bearings, *Thrust bearings, *Gas bearings, *Handbooks, Blowers, Velocity, Stabilization, Test methods, Rotation, Vibration, Starting, Life expectancy, Reliability, Corrosion, Electric motors.

Efforts continued on the development of gas lubricated journal and thrust bearings for use in blower motors. Start-stop testing on a prototype motor-blower unit demonstrated the ability of the gas bearing design to withstand 66,600 start-stop cycles without harm to the performance of the bearing. Continuous operation of the prototype unit for 1192 hours produced very little wear on the thrust bearing surfaces, indicating their ability to meet the 20,000 hour design life requirement of this development program. Three units made to final design configuration successfully completed vibration and salt spray testing with no detrimental effects on bearing performance. All testing to date indicates that the final design units will meet all performance and qualification test requirements. Work was completed on the section of a gas bearing design manual dealing with the prediction of half-frequency whirl, and work continues on the final section of the manual, which concerns the design of gas thrust bearings. (Author)

AD-402 801 Div. 26
(TISTE/CRJ) OTS price $5.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
STEADY-STATE CHARACTERISTICS OF GAS-LUBRICATED, SELF-ACTING, PARTIAL-ARC, JOURNAL BEARINGS OF FINITE WIDTH.
Interim rept.,
by V. Castelli, C. H. Stevenson, and E. J. Gunter, Jr. Apr 63, 46p. I A2049 18
Contract Nonr234200, Task 062 316
Unclassified report

Descriptors: *Journal bearings, *Gas bearings, Partial differential equations, Perturbation theory, Theory, Mathematical analysis, Lubrication, Stability.

The description is presented of a solution of the problem of self-acting, gas-lubricated, partial-arc, finite-length journal bearings for steady-state conditions. The results can be used for bearings of many types such as simple, fixed, partial-arc journal bearings (tapered land), axial-grooved journal bearings, pivoted-pad journal bearings, and similar geometric shapes. Sample results are plotted, and their utilization for various bearing types is illustrated by examples. (Author)

AD-403 063 Div. 26
(TISTE/CRJ) OTS price $11.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
SOLUTION OF THE STABILITY PROBLEM FOR 360 DEGREE SELF-ACTING, GAS-LUBRICATED BEARINGS OF INFINITE LENGTH.
Interim rept.,
by V. Castelli and H. G. Elrod, Jr. Mar 63, 154p. I A2049 20
Contract Nonr2342 00, Task NR062 316
Unclassified report

Descriptors: *Gas bearings, *Journal bearings Integral transforms, Tables, Partial differential equations, Perturbation theory, Mathematical analysis, Theory, Stability.

The stability of self-acting, gas-lubricated bearings was investigated. Two approaches to the solution are presented and their results are compared. Also, the relation between the present work and other, more simplified, methods available in the literature is discussed. The particular case of a 360 degree journal bearing of infinite length is treated, and the changes necessary to use the same theories with other geometries are pointed out. Available experimental results are collected and compared with theory. (Author)

AD-403 142 Div. 26
(TISTM/AW) OTS price $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A GENERAL STUDY OF PROCESSES FOR THE REALIZATION OF DESIGN CONFIGURATIONS IN MATERIALS.
Interim technical rept. no. 4, 3 Nov 62-3 Apr 63,
by Paul Rosenthal. Apr 63, 1v. NM1559P4
Contract AF33 600 42921, Proj. NR7 867
ASD IR4

Unclassified report

Descriptors: *Manufacturing methods, Processing, Materials, Material forming, Material removal, Material separation, Cavitation, Oxidation, Energy, Bonding, Vapor plating, Design, Surface properties, Effectiveness.

Concepts for two new process categories, cavitation and spontaneous oxidation, are investigated. General guidelines for process synthesis are developed based on the material properties, topological characteristics of the processes, the energy transformation involved and the environmental conditions essential to the energy transfer. These characteristic features of material removal, material joining, and material displacement processes are developed. Two general approaches to improving material removal processes are cited: the first is concerned with reducing surface energy by environmental means, the second with modification of the geometry of the failure mechanism, so as to reduce the energy required. Material removal processes synthesis includes microscopic and macroscopic aspects of relaxation and resonance in materials, cavitation, and chemical removal. (Author)

AD-403 357 Div. 26, 17
(TISTM/AMS) OTS price $1.75

Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Interim Engineering rept. no. 15, 1 Jan-31 Mar 63,
by L. M. Christensen. 31 Mar 63, 61p. NOR63 64
Contract AF33 600 36713

Unclassified report

Descriptors: *Extrusion, *Manufacturing methods, *Steel, Stainless steel, Hot working, Drawing (Machine processing), Design, Dies, Thickness, Surface properties, Temperature, Cooling, Hardness, Presses (Machinery), Heating, Lubrication, Heat treatment, Material removal, Tensile properties, Impact shock, Reports, Experimental data.

An optimized extruding and warm drawing process has been established for PH15-7MO. The salient features of the process are: (1) A container temperature at the liner surface of approximately 900 F is mandatory in order to consistently obtain crack free thin PH15-7MO steel extrusions. (2) Selective subcooling of the point area to a martensitic type metallurgical structure is practical and results in a very substantial improvement in point durability. (3) Multiple draw passes are possible without intermediate thermal treatment on PH15-7MO although work hardening does occur. (Author)

AD-403 441 Div. 26, 32, 17
(TISTM/ODN) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
COLD WELDING IN A VACUUM: AN ANNOTATED BIBLIOGRAPHY.
comp. by Scott J. Buginas. Mar 63, 16p. 5 73 63 1; SB63 5

Unclassified report

Descriptors: *Bibliographies, *Welding, Cryogenics, Low temperature research, Diffusion, Surfaces, Adhesion, Space environmental conditions, Metals, Friction, Theory, Low-pressure research.

This bibliography includes references issued primarily during the years 1959-1962. References are in alphabetical order by author's name. Search was completed Dec 1962. (Author)

AD-403 493 Div. 26, 17, 21
(TISTM/AMS) OTS price $16.00

Defense Metals Information Center, Columbus, Ohio.
A GUIDE TO THE LITERATURE ON HIGH-VELOCITY METALWORKING,
by D. C. Strohecker and D. H. Owens. 3 Dec 62, 244p.
DMIC

Unclassified report

Descriptors: *Material forming, *Metals, *Alloys, *Bibliographies, Explosive forming, Hardening, Material removal, Industrial equipment, Machining, Manufacturing methods, Velocity, High pressure research, Explosive materials, Energy, Powder metallurgy, Firing mechanisms (Ammunition), Mechanical properties.

This report is a guide to the literature on high-velocity metalworking. It consists primarily of abstracts of articles, reports, books, and current research projects on and related to high-velocity metalworking arranged according to technical subject. It covers a survey of the reported work in the field up to about October of 1962. Abstracts of over 700 references have been arranged by subject matter, with cross indexing between subjects. There is also an author index. The eleven major subjects and categories covered in the report are: (1) Energy Sources, (2) Energy Transfer Mediums, (3) Facility Requirements, (4) Tooling Requirements, (5) Equipment Requirements, (6) Forming, (7) Hardening, (8) Explosive Welding, (9) Powder Compaction, (10) Metal Removal, and (11) Material Behavior. (Author)

27. PROPULSION SYSTEMS

AD-402 666 Div. 27
(TISTA/LSK) OTS price $3.60

Pennsylvania State U., University Park.
BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINE LOW TEMPERATURE PROBLEMS. INDEX VOLUME.
Second edition,
by W. E. Meyer. 1962. 40p.
Contract DA36 034ORD3199RD
Unclassified report

Descriptors: *Internal combustion engines, *Diesel engines, *Bibliographies, Compressed air, Low temperature research, Ignition, Indexes.

This bibliography consists of this index volume and a set of abstract cards. This second edition is a complete and thorough revision of the first edition. The scope of the bibliography remains unchanged, but its interpretation is slightly different in that it is more rigorous. The bibliography deals with all aspects of low temperature (or cold weather) operation of compression ignition engines. It lies in the nature of the subject that the literature on it deals heavily with the starting problem. (Author)

AD-402 737 Div. 27, 7
(TISTA/LSK) OTS price $8.60

Allison Div., General Motors Corp., Indianapolis, Ind.
CONTINUATION OF 3-KW STIRLING CYCLE SOLAR POWER SYSTEM PROGRAM.
Quarterly technical progress rept. no. 2, 1 Aug-31 Oct 61.
14 Nov 61, 88p. EDR2381
Contract AF 33 616 8332, Proj. 3145, Task 30500
Unclassified report

Descriptors: *Heat engines, *Auxiliary power plants, External combustion engines, Electric power production, Power supplies, Heat exchangers, Design, Solar radiation.

The second quarter activity on Phase II of the three-phase, 3-kw, Stirling Cycle Solar Power Systems Program is described. Phase I consisted of the design and experimental evaluation of a research model of the advanced Stirling engine, applied research of solar concentrators, heat receivers, thermal energy storage devices, radiators, orientation devices, system controls, seals, and studies preparatory to the design of a deployable concentrator orbital experiment. Phase II is directed toward improving the performance of the research advanced Stirling engine to ensure attainment of a net output of 3 kw of electrical power at a minimum brake thermal efficiency of 30% in the flight-type engine design. Phase II consists of three basic tasks: (1) engine component investigations, (2) Model PD-46 research engine performance improvement, and (3) flight-type engine design and partial fabrication. The work to be accomplished during the second quarter included: (1) continuation of PD-46 engine problem elimination and performance tests, (2) continuation of power piston seal development program, (3) evaluation of heat exchanger circuit pressure losses under pulsating flow conditions, (4) shakedown ground tests and flight tests of zero 'g' lubrication test rig, and (5) completion of the design of the Model PD-67 lightweight engine components. (Author)

AD-402 738 Div. 27, 7
(TISTA/LSK) OTS price $2.60

Allison Div., General Motors Corp., Indianapolis, Ind.
CONTINUATION OF THE 3-KW STIRLING CYCLE SOLAR POWER SYSTEMS PROGRAM.
Monthly progress rept. for Sep 61.
Sep 61, 22p. EDR2323
Contract AF33 616 8332, Proj. 3145, Task 30500
Unclassified report

Descriptors: *Heat engines, *Auxiliary power plants, External combustion engines, Electric power production, Power supplies, Heat exchangers, Design, Solar radiation.

Contents:
Problem elimination test program--Model PD-46 engine
- Engine tear-down inspection
- Modification and engine build-up no. 8
- Future planning
- PD-46 performance
- References

Engine component investigation
- Seal development program
- Unit heat exchanger test

Model PD-67 Stirling engine design
- Cylinder head design
- Drive mechanism design
- Crankcase design

AD-402 745 Div. 27, 1
(TISTA/VGW) OTS price $1.60

Ministry of Aviation (Gt. Brit.).
PROBLEM OF AIR-COOLING GAS TURBINE BLADES
(K Voprosu o Vozdushnom Okhlazhden II Lopatok Gasovykh Turbin),
by A. G. Zenukov. Apr 63, 7p. TIL/T.5374
Unclassified report

Trans. from Izv. Vyssh. Uchebn. Zavedenii. Aviats. Tekhnika, Kazan, USSR, v. 2, pp. 130-137, 1962.

Descriptors: *Gas turbine blades, Design, Heat transfer, Honeycomb cores, Sandwich construction, Air-cooled.

A design of blade is described in which the profiled cover surface surrounds, but is not rigidly secured to a central supporting stem which is integral with the blade root. The external cover is free to expand. All the stresses on the blade assembly are taken by the 'cold' stem. Cooling air passes from the blade root, between the stem and cover shell. (Author)

AD-402 893 Div. 27
(TISTA/LSK) OTS price $3.60

Aerojet-General Corp., Sacramento, Calif.
ACOUSTICAL ANALYSIS OF FILAMENT-WOUND POLARIS CHAMBERS.
Bimonthly progress rept. no. 4,
by C. S. Lockman. 25 Mar 63, 8p. 0672 01BM4
Contract NOw62 1007c
Unclassified report

Descriptors: *Rocket cases, Rocket motors (Solid propellant), Guided missiles (Surface to surface), Test methods, Hydrostatic pressure, Recording systems, Sound reproduction systems, Filament wound construction, Acoustic properties.

This report includes a discussion of the data-presentation and data-evaluation techniques, presents the test data obtained to date for both test objectives, and describes the data-acquisition and playback systems and their application. Results from Phase I testing show that there is significant relationship between the sounds emanating from a filament-wound chamber during hydrostatic testing and the structural integrity of the chamber. The measured acceleration amplitude (rms) during hydrostatic testing is a function of chamber burst pressure and, as the data show, is inversely related to the burst pressure. Comparative data for three chambers tested to both the proof and burst pressure demonstrated the sensitivity of the accelerometer techniques of measurement. The results of Phase II testing show that the velocity of sound in the forward and aft heads and in the cylindrical section of Polaris Model A3X chambers differs (9314, 11, 294, and 10, 608 ft/sec, respectively). These data also show that the direction of filament-winding and superimposed stress fields do not affect the velocity of sound through a Polaris Model A3X chamber of resin-impregnated E-HTS glass roving. (Author)

AD-403 077 Div. 27, 7
(TISTE/JWS) OTS price $6.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
EXPERIMENTAL DETERMINATION OF OPEN-LOOP FREQUENCY RESPONSE CHARACTERISTICS OF DLG-6 CLASS STEAM GENERATOR SYSTEM,
by J. W. Banham, Jr. and P. H. Zavod. 4 Mar 63, 1v. Proj. B502I
Task 4182
Unclassified report

Descriptors: *Boilers, *Frigates, Measurement, Tests, Blowers, Frequency, Phase studies, Mathematical analysis, Mathematical models, Control systems.

Open loop frequency response measurements were made of the elements comprising the DLG-6 Class main boiler and its several control loops. Bode diagrams were curve fitted and the approximate transfer functions obtained in mathematical form. Results were analyzed both for agreement of open-loop transfer functions with continuity of energy and mass theory, and for closed loop conformance with stability criteria. Data indicated that steam boiler systems do not lend themselves readily to high performance control, principally due to large phase lags inherent in the process at low frequencies. The chief offenders in this regard are the forced draft blowers, the heat sink, and the additional integrations in the controllers themselves. (Author)

AD-403 310 Div. 27, 9
(TISTP/JW) OTS price $5.60

David Taylor Model Basin, Washington, D. C.
EFFECT OF AXIAL POSITION OF PROPELLER ON THE PROPULSION CHARACTERISTICS OF A SUBMERGED BODY OF REVOLUTION,
by John L. Beveridge. Mar 63, 49p.
DTMB 1456 Unclassified report

Descriptors: *Bodies of revolution, Propellers (Marine), Thrust, Analysis of variance, Underwater propulsion, Axially symmetric flow.

The propulsion performance of a submerged body of revolution was determined when the axial clearance between a stern propeller and the body was varied. Theoretical and experimental results indicate that variations, within the range of investigation, in the longitudinal position of a stern propeller do not critically affect the propulsive coefficient. In addition to these results, calculation of the propellers and the thrust deduction is discussed, and experimental results obtained from numerous wake traverses are presented. (Author)

AD-403 311 Div. 27, 22, 12
(TISTW/JEA) $4.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
PARAMETRIC DESIGN CURVES FOR SHORT RANGE, HIGH ACCELERATION BALLISTIC ROCKETS,
by Herman R. Oswell. 1 Apr 63, 35p.
Proj. 1A2 22901A202
AMC RF TR63 7
Unclassified report

Descriptors: *Exterior ballistics, Analysis, Rocket propulsion, Acceleration, Weight, Ranges (Distance), Propellants, Equations, Range tables, Booster rockets, Rockets, Curve fitting.

A compilation of design curves are presented which will permit the rapid estimation of the effects of range, warhead weight, diameter, specific impulse, and propellant weight fraction on the weight and length of short-range, high-acceleration ballistic rockets. (Author)

AD-403 312 Div. 27, 9
(TISTP/JW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
CAVITATION TESTS OF ESCORT RESEARCH VESSEL COUNTERROTATING PROPELLERS 3808 AND 3809 IN SIMULATED WAKE.
by James G. Peck. Mar 63, 15p.
DTMB 1731
Unclassified report

Descriptors: *Cavitation, Fluid flow, Rotation, Wake, Water tunnels, Pressure, Propellers (Marine).

A pair of counterrotating propellers, designed for the escort research vessel, were tested in Taylor Model Basin variable-pressure water tunnel. Cavitation characteristics of the pair operating in a wake are presented. Cavitation inception curves, open-water characteristics and sketches of the cavitation are included. (Author)

AD-403 456 Div. 27, 25
(TISTM/ODN) OTS price $6.60

Texaco Experiment, Inc., Richmond, Va.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE
Final rept., 1 June-17 Aug 62,
by Welby G. Courtney. 14 Apr 63, 63p. EXP328; TM1377
Contract Nonr314100
Unclassified report

Descriptors: *Rocket motor nozzles, *Reaction kinetics, *Lithium compounds, *Condensation, Boron compounds, Oxides, Hydroxides, Vapors, Water, Nucleation, Theory, Low-temperature research, High-temperature research, Melting, Cloud chambers, Argon, Nitrogen, Helium, Pressure, Computers, Fluorides.

This program is a theoretical and experimental investigation of the kinetics and mechanisms of condensation and particularly of homogeneous nucleation from the vapor phase. Theoretical results are reported for (a) the rate of formation of solid H2O drops during condensation under constant-volume conditions, (b) the rate of steady-state nucleation from a hypothetical complex vapor system using Li-F data as a base point and arbitrary rate constants, (c) the rate of condensation in generalized B2O3 and LiF systems, and (d) the corresponding rates of condensation in certain B-O-H and Li-F systems in a rocket nozzle. The mathematical theory required to permit quantitative comparison between experimental and theoretical rates of condensation is given, but the comparison was not made. In view of the incomplete analysis, the raw data from the experimental pressure-time curves obtained during condensation in the cloud chamber used in this work are included in an appendix. (Author)

AD-403 459 Div. 27, 26
(TISTM/EJH) OTS price $2.60

ARDE-Portland Inc., Paramus, N. J.
CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES.
Quarterly technical rept. no. 3, 1 Dec 62-1 Mar 63,
by George Claffy. 1 Mar 63, 16p.
Contract DA30 069ord3501

Unclassified report

Descriptors: *Rocket cases, *Stretch forming, *Pressure vessels, *Manufacturing methods, Cold working, Cylindrical bodies, Configuration, Welds, Hydroforming (Mechanical), High pressure research, Industrial equipment, Programming, Design, Analysis.

Five vessel configurations (total of ten vessels) were cryogenically stretched prior to the occurrence of a breakdown in the strength facility. Two of the configurations incorporated dog-bone components and were stretched as part of the program to develop the elliptical head. A simple vessel incorporating a thrust skirt, and two configurations for producing high-strength domes, were also stretched. Testing was interrupted due to a gross failure of the cryogenic pump of the stretch facility. The computer program, for analytically determining the final shape to be achieved by cryogenically stretching a given preform vessel, was checked against actual data from a stretched vessel. The results indicate that the plasticity equations and the computer program are capable of predicting the stretched shape with a high degree of accuracy. The first simple, full-size vessel was assembled during this report period and rejected for bad welds. The problem proved to be one of dimensional tolerance on the head diameter. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-402 672 Div. 28, 12
(TISTB/AW) OTS price $1.60

Boeing Co., Seattle, Wash.
HUMAN ENGINEERING PLAN. WS-133B,
by William C. Blair and J. Daniel Hitt, Jr.
4 Jan 63, 14p. D2-30085
Contract AF04 694 266

Unclassified report

Descriptors: *Human engineering, Guided missiles (Surface to surface), Weapon systems.

AD-402 786 Div. 28
(TISTB/AW) OTS price $1.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
ZERO GRAVITY INDOCTRINATION FOR THE GEMINI/APOLLO ASTRONAUTS,
by Donald D. Mueller. Mar 63, 15p.
Proj. 7184, Task 718405
AMRL MP 31

Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: *Astronauts, *Weightlessness, Psychomotor tests, Performance tests, Motion, Training.

The activities to be performed during weightless flight aboard the ASD zero-G aircraft for indoctrinating and training the Gemini/Apollo astronauts are described. The activities were chosen because they illustrate motions or behavior patterns that are significantly different during weightlessness from those under normal gravity conditions. The particular significance of each activity as it pertains to orbital flight is discussed. The period of weightlessness that can be produced aboard the KC-135 is approximately 30 seconds. Most of the activities described in this brochure can be completed safely within the 30 seconds allowed. (Author)

AD-402 791 Div. 28
(TISTB/AW) OTS price $3.60

Washington U., St. Louis, Mo.
AN EXPERIMENTAL STUDY OF THREE RESPONSE MODES IN SOCIAL INFLUENCE SITUATIONS.
Technical rept.
by Richard H. Willis and E. P. Hollander.
Feb 63, 32p.
Contract Nonr816 12

Unclassified report

Descriptors: *Behavior, Personality, Group dynamics, Statistical distributions, Theory.

A test is provided of a conceptual framework which specifies three response modes in a social influence situation: conformity, independence, and anticonformity. An individual can exhibit, over the course of several trials, any combination of independence or net conformity, i.e., conformity minus anticonformity. The object of this experiment was to manipulate simultaneously a number of independent variables so as to elicit one of the three basic modes of reacting from each of the three experimental groups. Conditions for one group were designed to maximize conformity, those of the second to maximize independence, and those of the third to maximize anticonformity. The prediction that these reactions can be brought under experimental control and can be substantially and differentially produced in the laboratory was confirmed. Differences among experimental groups were sizeable as measured either by over-all differences in independence and net conformity or by movement scores. In the case of the condition de-

signed to maximize independence behavior, the theoretical limit was closely approached. For the conformity and anticonformity groups, the respective limits were less closely approached, but magnitudes of movement towards these limits were larger than in the case of the independence group. (Author)

AD-402 843 Div. 28
(TISTB/AW) OTS price $.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A COMPARISON BETWEEN TRACKING WITH ''OPTIMUM'' DYNAMICS AND TRACKING WITH A SIMPLE VELOCITY CONTROL.
Final rept.,
by George G. Frost. Dec 62, 16p.
Proj. 7184, Task 718404
AMRL TDR62 150
Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: *Tracking, Test methods, Simulation, Performance tests, Human engineering, Models (Simulations), Transfer of training, Functions.

This study was undertaken to verify the 'optimum' control dynamics reported in WADC TR 59-712 and to lend experimental validation to the method in which they were derived. A simple two group experiment was performed to compare tracking performance on a single axis tracking task using the 'optimum' dynamics with tracking performance using a simple integrator (rate control). No significant difference was found in either learning rate or in tracking ability after the task was learned. A second experiment using the same experimental design requiring two-axis tracking was conducted to test the hypothesis that differences would appear only when the subjects were more heavily task-loaded. The 'optimum' dynamics produced reliably better performance than the rate control in the two-axis task. This result supplied experimental validation for the predictions made using the human transfer and reported in WADC TR 59-712. (Author)

AD-402 892 Div. 28
(TISTB/AW) OTS price $7.60

Rutgers U., New Brunswick, N. J.
HOMEOSTASIS THEORY OF SMALL GROUPS VIII: LONGITUDINAL STUDY,
by Bernard P. Indik, and John Tyler. Jan 63, 72p.
TR11
Contract Nonr404 10
Unclassified report

Descriptors: *Group dynamics, Adjustment (Psychology), Social communication, Theory, Women.

A longitudinal study of six groups of females is reported. Six hypotheses developed from a homeostatic conception of small groups were studied over time. As expected, the outcome variables - adaptability, group need satisfaction (G.N.S.), and formal achievement (F.A.) - maintained considerable stability during pre-disturbance group sessions. Communications variables, however, showed some volatility prior to and during both the induced minor and major disturbances. The minor disturbances (addition of another female of the same status to the group) tended to change the kinds of communication (proportions of Bales general categories of communication) that occurred in the group more than the communication activity level of the group, which in turn tended to be more affected than the pattern of communication in the group. Some evidence of homeostatic readjustments in these variables in post-disturbance sessions was found, as well as some tendency for these new levels to be maintained in some few cases. It is also clear from these data that when a more severe disturbance occurred (entry of a higher status person into the group) groups high in G.N.S. and F.A. adapted more adequately to the more severe disturbance than groups that were moderate in G.N.S. and F.A., who in turn adapted more adequately than groups that were low in G.N.S. and F.A. (Author)

AD-403 026 Div. 28
(TISTM/PCR) OTS price $1.60

Human Factors Research Inc., Los Angeles, Calif.
SUBJECTIVE REACTIONS OF VIGILANCE PERFORMERS,
by James J. McGrath. May 60, 10p.
Contract Nonr2649 00, Proj. NR153 199
Unclassified report

Supplementary Note to Tech. repts. 2 and 4 on Human Factor Problems in Anti-Submarine Warfare.

Descriptors: *Attention, Psychology, Reaction (Psychology), Antisubmarine warfare, Human engineering, Applied psychology, Projective techniques, Attitudes, Psychometrics.

The experimenters' objectives were (1) to obtain introspective reports concerning the subjects' general attitudes toward the experiment; (2) to obtain information regarding any change in the motivational state of the subjects as the experiment progressed from week to week, and any change during a typical one-hour watch; and (3) to get some indication of the subjects' intellectual approaches to the vigilance tasks. (Author)

AD-403 029 Div. 28, 23, 6
(TISTW/JEA) OTS price $3.60

Human Factors Research, Inc., Los Angeles, Calif.
IMPROVEMENT IN SONAR OPERATOR DETECTION PERFORMANCE CONSEQUENT TO THE USE OF OPTIMUM BIAS AND GAIN,
by C. H. Baker. Feb 63, 31p. TR206 20
Contract Nonr264900, Proj. NR153 199
Unclassified report

Report on Human Factor Problems in Anti-submarine Warfare.

Descriptors: *Sonar personnel, Sonar targets, Cathode ray tubes, Vision, Target discrimination, Cybernetics, Sonar equipment, Target recognition, Viewing screens, Display systems, Brightness, Human engineering, Reliability, Performance tests.

Five experiments were undertaken using the visual display of a sonar stack. The first three were psychophysical in nature, undertaken to determine the effects of CRT bias (display brightness) and gain upon operators' target detection performance, at various ranges, with and without reverberations. Optimum values of bias and gain were determined. The fourth experiment was undertaken to determine values of CRT bias and gain considered optimum by experienced operators. In comparison with the values determined in the first experiment to be optimum, the average values of

the experienced observers represented a performance loss of about 10 decibels. The fifth experiment compared target detection performance of 26 operators in searching for targets when (1), the display was at experimentally determined optima of bias and gain, with that when (2) the display was at values of bias and gain set by the operators. When experimentally determined values of bias and gain were employed, there was an improvement in the percentage of targets detected by a factor of 10, and one quarter as many false reports of targets were made. A brief survey conducted aboard seven ships in port indicated that the findings of the fourth experiment would have been virtually the same had the data been collected at sea. (Author)

AD-403 381 Div. 28
(TISTB/AW) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
SIMULTANEOUS ACTIVATION OF BIMANUAL CONTROLS.
Rept. for Feb-Aug 62,
by M. J. Warrick and Lester Turner. Jan 63, 11p.
AF Proj. 7184, Task 718404
AMRL TDR63 6
Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: *Psychomotor tests, *Motor reactions, Man, Motion, Control, Thrust, Space environmental conditions, Rocket propulsion, Arms, Time.

The time interval between the release of a right-hand key and a left-hand key, when subjects were attempting to release them simultaneously, was measured to 0.1 millisecond. The mean interval of 20 subjects, 60 trials per subject without knowledge of results, was very close to zero (simultaneous). Approximately 94% of the intervals were with ±20 milliseconds of zero. The implications of the findings to the control of a personal space-propulsion unit are discussed. (Author)

AD-403 463 Div. 28
(TISTB/AW) OTS price $3.60

Washington U., St. Louis, Mo.
AN EXPERIMENTAL STUDY OF THREE RESPONSE MODES IN SOCIAL INFLUENCE SITUATIONS.
Technical rept.,
by Richard H. Willis and E. P. Hollander. Feb 63, 32p.
Contract Nonr81612
Unclassified report

Descriptors: *Personality, *Behavior, *Leadership, Perception, Test methods, Projective techniques, Social communication, Theory, Group dynamics, Reaction (Psychology).

A model of conformity-nonconformity response was recently suggested by Willis, and serves as the basis for this research. According to this model, at least two dimensions are required for the construction of an adequate theoretical framework for representing conformity and non-conformity. The first of these dimensions is that of dependence-independence, while the second is that of conformity-anticonformity. These dimensions are represented as orthogonal to one another. Three basic modes of responding to felt social pressures are delineated--conformity, independence, and anticonformity. Pure conformity behavior is defined as a completely consistent attempt on the part of the individual to behave in accordance with the normative expectations of a specified group, as he sees them. Pure independence behavior occurs whenever the individual perceives relevant normative expectations, but gives zero weight to them as guides to his behavior. The independent person is one capable of resisting social pressures, rather than one who is unaware of them or who merely ignores them. (Author)

AD-403 494 Div. 28, 16, 30
(TISTB/AW) OTS price $1.60

Chicago U., Ill.
STUDIES OF PATTERN-PERCEIVING AND LEARNING NETWORKS,
Annual rept.,
by Peter H. Greene. 31 Dec 62, 7p.
Contract Nonr2121 17, Proj. NR049 148
Unclassified report

Descriptors: *Sensory mechanisms, *Nervous system, *Behavior, *Bionics, Perception, Theory, Infants, Pattern recognition, Networks, Learning, Mathematical models, Programming (Computers), Mathematical analysis, Sensory mechanisms.

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-402 934 Div. 29
(TISTM/PCR) OTS price $.50

Naval Research Lab., Washington, D. C.
A VACUUM PNEUMATIC PROCESS FOR FILLING LARGE DRY CHEMICAL FIRE EXTINGUISHERS.
Final rept.,
by H. B. Peterson, R. L. Tuve, R. L. Gipe, and J. W. Porter. 10 Apr 63, 13p. 5942
Unclassified report

Descriptors: *Fire extinguishers, Pneumatic systems, Vacuum apparatus, Design, Instruction manuals, Photographs, Maintenance.

A pneumatic conveying system was developed for filling large fire extinguishers with dry chemical powder. The system is intended particularly for air stations and similar field establishments; it could even be used for reloading extinguishers at the site of a fire. The essential components are a 1-1/2 horsepower vacuum cleaner and an especially designed device which is used in place of the extinguisher fill cap which separates the powder from the air stream, and also provides entry for a powder level gage stick. In trials at the Laboratory this system reduced the filling time for a 400-lb. capacity dry chemical air-lift extinguisher from 46 to 6 minutes, reduced dusting to a negligible amount, and allowed correct gaging of adequate charge amounts. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-402 599 Div. 30
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BINARY PARALLEL SUMMATOR WITH THROUGH TRANSFER,
by L. P. Afinogenov and V. G. Kolosov. 25 Mar 63, 4p.
FTD TT63 175

Unclassified report

Trans. from Russian Patent Nr. 142818 (642726/26, January 6, 1960), 1960, pp 1-3.

Descriptors: *Computer logic, Magnetic cores.

A binary parallel summator with through transfer, utilizing the impedance principle of ferrite work is composed of paraphase ferrite registers of the first and second addends, and is connected by census bus-bars for realization of the logical function of addition according to the 'two' modulus with ferrites of the summator. Census bus-bars, the states of which for obtaining sums in a given place and the transfer and its inversion in the following place, pass through the ferrites of the sum register, and are connected with the inversed and direct output of the transfer of the preceeding place. They are distinguished by the fact that, for the purpose of enlarging the reliability, compensation bus-bars pass through the ferrites of the registers and the summator. (Author)

AD-402 611 Div. 30
(TISTP/FR) OTS price $4.60

Block Associates, Inc., Cambridge, Mass.
DESIGN HISTORY AND THEORY OF OPERATION OF A TWO-CHANNEL, ROCKET-BORNE EBERT GRATING SPECTROMETER.
Scientific rept. no. 5,
by Merle J. Persky, Eugene K. Dana, and Geert Wyntjes. 9 Jan 63, 1v.
Contract AF19 604 5738
AFCRL 63 254

Unclassified report

Descriptors: *Ultraviolet spectrophotometers, *Infrared spectrophotometers, Rockets, Guided missiles, Ultraviolet filters, Infrared filters, Mirrors, Diffraction gratings, Photomultipliers, Infrared detectors, Preamplifier, Amplifiers, Power supplies, Commutators.

A two-channel Ebert grating spectrometer is described. The ultraviolet channel scans the 2300 A to 7000 A spectral region. The infrared channel scans the 2.3-mu to 7-mu spectral region. Built-in calibration is provided to monitor the response of the two spectral channels and the operation of the telemetering system. Data commutation is used to time-multiplex the information onto a single-channel data link. The system is fully transistorized and both mechanical and electrical design are compatible with rocket-borne environments. In addition to the design and development history and general design considerations for this type of instrument, information is also presented on the details of operation of the instrument. (Author)

AD-402 624 Div. 30, 18
(TISTP/TL) OTS price $3.60

System Development Corp., Santa Monica, Calif.
OPERATIONS RESEARCH IN PRODUCTION OF SYSTEM TRAINING EXERCISES,
by K. R. Wood and H. J. Zagorsky. 15 Mar 63, 35p. TM1042 103 00

Unclassified report

Descriptors: *Aircraft defense systems, *Military training, *Simulation, Production, Statistical analysis, Data processing systems, Statistical tests, Polynomials, Numerical analysis, Matrix algebra, Factor analysis, Vector analysis, Computers, Least square method, Mathematical models, Operations research, Scheduling, Training.

The research conducted during the past three years in production scheduling of air defense system training exercises is presented. The system training exercise (or problem) as a simulation of aircraft movement, offensive, and contrasurveillance activity, and of certain defense-system reactions is described. The system training problem production is therefore concerned with production of Air Defense System simulation inputs and accessory materials for system training. (Author)

AD-402 627 Div. 30
(TISTP/JW) OTS price $6.60

Thompson Ramo Wooldridge Inc., Canoga Park, Calif.
COMPUTER-AIDED RESEARCH IN MACHINE TRANSLATION.
Progress rept. no. 2.
31 Jan 63, 1v. C157 3U1

Unclassified report

Descriptors: *Machine translation, Language, Errors, Programming (Computers), Reliability (Electronic), Computer logic, Input-output devices, Computers.

AD-402 646 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
THE EFFECTS OF ELECTRONIC DATA PROCESSING IN FUTURE INSTRUCTIONAL SYSTEMS,
by Don D. Bushnell. 27 Mar 63, 5p. Rept. no. SP1118/001/00

Unclassified report

Descriptors: *Data processing systems, Learning, Management engineering, Simulation, Computers, Symposia, Information retrieval, Teaching machines.

Summarizes computer developments as follows: The computer-based teaching machine: by branching students laterally, backward, and forward through subject material, the machines develops a course of study particularly suited to the individual student's educational background, level of motivation, and aptitude. Information retrieval systems: up-to-date information in any area of the arts and sciences can be provided by information centers utilizing abstracting and translating machines, techniques of rapid retrieval and dissemination of data. Simulation programs: computer-based simulation programs will aid ongoing management and instruction activities by: supplying periodic economic or population forecasts; helping to balance budgets;

giving guidance in the planning of new educational facilities; expediting the training and selection of educators; facilitating classroom and vocational instruction. The automated classroom: new technology for processing educational data and for organizing instructional material in the classroom.

AD-402 647 Div. 30, 32
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
COMPUTER GENERATION OF WORD ASSOCIATION MAPS FOR MAN-MACHINE COMMUNICATION,
by Cameron Watson. 25 Mar 63, 24p. SP1153
Unclassified report

Descriptors: *Data processing systems, *Information retrieval, Language, Display systems, Digital computers.

Considers the problems of generating and displaying association maps through the use of a digital computer. States that the term "association maps" denotes a two-dimensional array of elements with lines drawn between the elements to indicate an associative relationship. Reports that the association map is used for man-machine communication in an information retrieval system. (Author)

AD-402 648 Div. 30, 12
(TISTP/MB) OTS price $1.60

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS - MILESTONE 11. WRITE CHANGE TAPE (SWRTOUT),
by R. C. Wise. 12 Mar 63, 11p. TM L 715 044 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), Satellite networks.

SWRTOUT (Write Change Tape) produces a tape for later use by the program SMERGE. The tape contains messages input to SWRTOUT and operated upon by SWRTOUT. SWRTOUT accepts individual or grouped messages from a user program and collects like messages until a block of these messages is built, then adds a checksum and writes the messages on a magnetic tape. (Author)

AD-402 659 Div. 30, 12
(TISTP/MB) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS INTRODUCTION AND TABLE OF CONTENTS,
by C. L. Hill. 19 Mar 63, 4p. TM L705/000/00B
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Indexes, Handbooks, Space surveillance systems.

AD-402 660 Div. 30, 12
(TISTP/MB) OTS price $1.60

System Development Corp., Santa Monica, Calif.
GENERAL PURPOSE SATELLITE COMPUTER PROGRAM DESCRIPTION MILESTONE 11 PROGRAM ROUTINE TO PREPARE FLIGHT SUPPORT DATA PACKAGE TAPES (SPDPT),
by G. D. West. 25 Mar 63, 12p. TM(L)714/034/00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), *Space surveillance systems, Satellite networks, Orbital trajectories.

Reports that SPDPT is a program routine to prepare flight support data package tapes for vehicles which carry programmable orbital timers. States that SPDPT is coded for the CDC 1604 and is compatible with the current CPDC operating procedures.

AD-402 661 Div. 30, 12
(TISTP/MFA) OTS price $1.10

System Development, Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS INTRODUCTION AND TABLE OF CONTENTS,
by C. L. Hill and J. A. Kneemeyer. 25 Apr 62, 4p. TM L705/000/00
Contract AF04 695 40
Unclassified report

Descriptors: *Programming (Computers), *Space surveillance systems, Handbooks, Satellite networks.

Reports that the Satellite Control Facility's Computer Program Systems Manual is a collection of systems programming and operations information. States that the manual consists of four TM series which are sub-titled Utility Programs (TM(L)-705), General PRURPOSE Satellite Programs (TM(L)-725), Satellite Specific Programs (TM(L)-722, and Satellite Facility Computer Operations Procedures (TM(L)-723).

AD-402 662 Div. 30, 12
(TISTP/MFA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS. INTRODUCTION AND TABLE OF CONTENTS,
by C. L. Hill. 2 Jan 63, 3p. TM(L) 705 000 00A
Contract AF04 695 40
Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Handbooks, Space surveillance systems.

AD-402 781 Div. 30
(TISTA/GEC) OTS price $7.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
MECHANICAL DESIGN OF THE 50-INCH MACH 10-12 TUNNEL,
by Charles M. Howard and H. T. Wood, Jr. Apr 63, 72p.
Contract AF40 600 1000
AEDC TDR62 229
Unclassified report

Descriptors: *Hypersonic wind tunnels, *Wind tunnel nozzles, Operation, Control systems, Data processing systems, Instrumentation, Design.

The design of a 50-inch-diameter, continuous-flow, Mach 10-12 wind tunnel, currently operating at Mach 10 only, is described and related

operational experience discussed. The tunnel is equipped with an axisymmetric, contoured nozzle and with a fast model injection/retraction system. Control and data readout systems are described. (Author)

AD-402 787 Div. 30, 16
(TISTM/DGH) OTS price $4.60

Army Biological Labs., Frederick, Md.
RESPIRATORY EXPOSURE OF ANIMALS TO MICROORGANISMS WITH THE HENDERSON APPARATUS,
by Orrin T. Miller and Gardner G. Gremillion.
Apr 63, 48p. TM39
Proj. 4B11 05 015
Unclassified report

Report on Safety Measures for Protection Against BW Research and Development Hazards.

Descriptors: *Aerobiology, *Laboratory equipment, Laboratory animals, Microorganisms, Respiratory system, Aerosols, Test methods.

The Henderson Apparatus has been in use for many years for the study of infectious disease transmission by the respiratory route. It is a simple, inexpensive apparatus for exposure of small animals to dynamic aerosols. This report presents detailed information concerning necessary equipment and techniques for conducting this type of experiment in a safe manner. References are made to commercial sources of equipment where these are pertinent. (Author)

AD-402 788 Div. 30
(TISTP/JW) OTS price $9.10

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept., Oct-Dec 62.
1 Mar 63, 108p.
NAVWEPS 8141
Unclassified report

Descriptors: *Scientific research, Ferromagnetic materials, Crystals, Infrared spectroscopy, High temperature research, Polymers, Electrochemistry, Nonlinear systems, Semiconductors, Microwaves, Spectra (Infrared).

During the second quarter of fiscal year 1963, Foundational Research projects were conducted in the following general areas: ferromagnetic research; high temperature polymers; infrared atomic spectra; nonaqueous electrochemistry; nonlinear transmission lines; semiconductor microwave microelectronics; semiconductor physics; solid state spectroscopy; and spectral emittance of solids.

AD-402 789 Div. 30
(TISTP/RD) OTS price $4.60

Aircraft Armaments, Inc., Cockeysville, Md.
RAPID EMPLACEMENT AND RETRIEVING DEVICE FOR GROUND STAKES GP-112/G AND GP-113/G.
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by R. G. Strickland, T. G. Stastny, and C. Gonnerman. 31 Mar 63, 45p. ER2843B
Contract DA36 039sc90760
Unclassified report

Descriptors: *Anchors (Structural), *Soils, Hammers, Ballistics, Explosive actuators, Mechanical properties.

Experimentation was conducted to assess the energy required to emplace Ground Stakes GP-112/G and GP-113/G under typical and extreme soil conditions. Results of these tests, as well as prior tests and analytical investigation, were incorporated into the design and presented in a design plan. Visualization data was prepared and delivered. Detail drawings were prepared and a stress analysis of all parts completed. Analysis and experimentation were conducted to evaluate various retrieve approaches. Following approval of the design plan by USAELRDL, drawings were released for the fabrication of the first of three feasibility models of the ballistic impact hammer. The breadboard model of the ballistic impact hammer, employed in preliminary tests, was successfully demonstrated. (Author)

AD-402 792 Div. 30
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
CHRONICLES AS A REGENERATIVE RECORDING, SYSTEM TESTING, AND ANALYSIS CONCEPT FOR SAGE AND OTHER REAL-TIME DIGITAL SYSTEMS.
Technical memo.,
by H. Sackman. 15 Mar 63, 25p. TM1042 204 00
Unclassified report

Descriptors: *Data processing systems, Digital systems, Computers, Input-output devices, Programming (Computers), Antiaircraft defense systems.

Chronicles is introduced as an experimental recording vehicle which can regenerate an original computer test run in its entirety by playing back all the recorded inputs into the operational program. Although the playback notion is ancient history, the successful practical application of total system playback is recent and new for complex systems such as SAGE. Chronicles recording in SAGE emerged from an experimental DCA Model 8 design to its present experimental status in Model 9. Current applications of Chronicles in five SAGE studies are reviewed, demonstrating its versatility and some of the problems encountered in controlled system tests and exploratory investigations. A comparison with other SAGE recording vehicles indicates that Chronicles increases the usefulness of conventional recording and makes possible entirely new types of recording. Some possibilities for its extended use in SAGE are suggested for military, training, and programming applications. (Author)

AD-402 823 Div. 30
(TISTE/JWS) OTS price $3.00

Automation Industries, Inc., Torrance, Calif.
DEVELOPMENT OF ULTRASONIC TECHNIQUES FOR DEFECT EVALUATION.
Final rept., Dec 59-Oct 61,
by J. B. Ramsey and W. M. Rowe. Feb 63, 136p.
Contract AF33 616 6793, Proj. 7381, Task 73812
ASD TDR62 8
Unclassified report

Descriptors: *Test methods, *Ultrasonic radiation, Acoustic impedance, Acoustic properties, Propagation, Non-destructive testing, Collimators, Heat treatment, Attenuation.

The results of investigations to determine the effects of several metallurgical and acoustical variables on the ultrasonic signal strength using commercially available ultrasonic flaw detection equipment are reported. Applied to

various metals used in aerospace structures and components, these investigations resulted in the separation and determination of important acoustical properties that were expected to indicate the cause for differences in the transmission of ultrasonic energy in the various materials. A method was developed for applying correction factors to test blocks of one metal in order to estimate the size of defects in other metals. Beam collimation techniques were studied to determine optimum conditions for detecting defects and displaying them on both cathode ray image and C-Scan (plan view) facsimile paper recordings. Some investigations were also performed to separate and identify shear and surface (Rayleigh) waves. (Author)

AD-402 888 Div. 30, 27
(TISTA/LSK) OTS price $1.00

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
INFRARED TECHNOLOGY AND NONDESTRUCTIVE TESTING,
by Billy G. Martin. 14 Feb 63, 30p. RT TR63 1
Proj. 516 04 007
Unclassified report

Descriptors: *Rocket motors (Solid propellant), Infrared detectors, Bonding, Quality control, Infrared radiation, Test methods, Non-destructive testing.

This report presents infrared technology in general and its relation to the nondestructive testing of solid fuel rocket motors, primarily for unbond flaws. Various projects by government contractors concerning the use of IR techniques and instrumentation for unbond flaw detection are reviewed. (Author)

AD-402 894 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAM. SYMBOLIC DUMP ROUTINE (SYMDUMP).
Technical memo.,
by F. J. LaChapelle and R. L. Kinkead. 21 Mar 63, 8p. TM L 705 025 01
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), Computers, Satellite networks.

AD-402 898 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SATELLITE COMPUTER PROGRAM DESCRIPTION. MILESTONE 4. COMPUTE SHADOW TIMES (SHADOW).
Technical memo.,
by C. M. Seacat. 22 Mar 63, 9p. TM L 1124 000 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), Earth, Computers, Orbital trajectories, Satellite networks.

States that SHADOW is a 1604 COP-controlled program designed to compute the times at which a satellite enters and leaves the shadow of the earth. Also states that the inputs to this program are a reset tape containing orbital conditions and a function card specifying a time range and a time increment. (Author)

AD-402 899 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS. MILESTONE 11. OCTAL, SYMBOLIC, FLOATING POINT DECIMAL, OR BCD CORE DUMP (CORE).
Technical memo.,
by F. J. LaChapelle. 13 Mar 63, 3p. TM L 715 016 01A
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), Computers, Satellite networks.

AD-402 900 Div. 30
(TISTP/GRW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
PROGRAM DESIGN SPECIFICATIONS FOR MODIFICATIONS TO MULTICON,
by J. Hillhouse and H. Frieden. 1 Apr 63, 24p.
TM L891 006 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), *Satellite networks, Punched tape, Punched cards.

AD-402 901 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAMMING PROPOSAL. PROPOSAL FOR MODIFICATIONS TO THE OSCON SYSTEM,
by C. L. Hill. 27 Mar 63, 3p. TM890 012 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computers), Computers, Design, Data processing systems, Satellite networks.

The report proposes modifications to the OSCON 160-A peripheral processing system which would alleviate the inadequacies, errors and discrepancies existing at present in OSCON. The report states that the modifications fall into two categories; modifications which will effect major changes to the entire system and additions or corrections. (Author)

AD-402 902 Div. 30
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS. MILESTONE 11. READ BIRD BUFFER 1604 TRANSFER TAPE (SRDTRK),
by R. C. Wise. 12 Mar 63, 11p. TM L715 042 00
Contract AF19 628 1648
Unclassified report

Descriptors: *Programming (Computer), Computers, Tracking, Satellite networks.

Reports that the function of SRDTRK (Read Bird Buffer 1604 Transfer Tape) is to read specific information from the 160A-1604 transfer tape. Also reports that this specific information is Tracking messages, or Vehicle time messages, and is related to a particular station, vehicle and revolution. (Author)

AD-402 903 Div. 30
(TISTP/GRW) OTS price $3.60

System Development Corp., Santa Monica, Calif.
MILESTONE 11 COMPUTER UTILIZATION REPORTS (CUR),
by R. L. Thornton. 5 Apr 63, 34p. TM1003 011 00
Contract AF19 628 1648

Unclassified report

Descriptors: *Data processing systems, *Programming (Computers), *Satellite networks, Punched cards, Operation, Data storage systems.

CUR is a 160-A program which uses punched cards as input and generates an accurate report of time utilization on all computing equipment within the CPDC. (Author)

AD-402 904 Div. 30
(TISTP/GRW) OTS price $4.60

System Development Corp., Santa Monica, Calif.
CONTROL OF AND AUTOMATIC ALLOCATION FOR LARGE-SCALE CYCLING SYSTEMS,
by C. P. Earnest. 15 Mar 63, 43p. TM1042 102 00

Unclassified report

Descriptors: *Programming (Computers), *Data storage systems, Control, Operations research, Scheduling.

A programmable method of storage allocation is presented, along with a scheme for system control, suitable for large-scale systems where something is known in advance about the sequence of program operations, and time of system operation is an important factor. Allocation is static, because dynamic allocation in systems of this type usually costs more time than it saves. The primary store is assumed to be of the continuous, random-access type, such as core memory. The SAGE and SATIN systems were used as models in developing this method. (Author)

AD-402 918 Div. 30
(TISTA/LSK) OTS price $3.60

Fluidyne Engineering Corp., Minneapolis, Minn.
HYPERSONIC TEST STAND MODEL INSTRUMENTATION SYSTEM,
by Charles Christopherson, William Hamre, Taro Matsuura, and John Wastvedt. Jan 63, 28p.
Contract AF33 616 7543, Proj. 7065, Task 7065 02
ARL 63 1

Unclassified report

Descriptors: *Hypersonic wind tunnels, Calibration, Mounting brackets, Aerodynamic heating, Strain gages, Transducers, Wind tunnel models, Instrumentation.

The model instrumentation for the Mach 14 Hypersonic Test Stand was developed to provide a means for supporting the articles in the test stand flow environment, varying the orientation of the test article with respect to the flow environment, and obtaining data on the force, pressure, and temperature loads to which the test article is exposed in the flow environment. The model instrumentation consists essentially of four sub-systems: (1) a model support system, (2) a model force measuring system, (3) a model surface pressure measuring system, and (4) a model surface temperature measuring system. (Author)

AD-403 030 Div. 30
(TISTB/AW) OTS price $1.60

Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
EQUIPMENT MODIFICATIONS AND FEASIBILITY DEMONSTRATION FOR IMPROVEMENT OF THE PHASE I UNIVAC ATC DATA PROCESSING SYSTEM.
Final engineering rept.
Sep 62, 15p. 2567
Contract FAA/BRD153

Unclassified report

Descriptors: *Data processing systems, Time switches, Air traffic control systems, Input-output devices, Timing devices.

The tasks are divided into four major problem areas: (1) real-time clock function, (2) data recovery, (3) data voiding by character and field, and (4) FAA system manual. As work progressed it became apparent that the proposed design on the real-time clock was not feasible. The only practical means found for generating time was to derive a pulse from a one-revolution-per-minute motor. A data register is used to provide storage and counting ability to convert the one-per-minute pulses into computer code time. The design using the magnetic tape unit for the data recovery system has certain shortcomings such as programming problems and overlap of the data recovered and the data printed during normal operation. It is therefore recommended that data recovery be accomplished by extracting data directly from the general storage drums. This would avoid duplicate printout of flight strips and programming problems with the implementation of CUE. Data voiding by character and by field is used to eliminate the time-consuming and error-prone backspacing procedure. The voiding system allows the operator to instruct the T&F Unit to void the previous character or the field that was being filled. The FAA System Manual enables technical personnel to understand the system and to provide continuing personnel with a more thorough understanding of the complete system. (Author)

AD-403 045 Div. 30
(TISTA/GEC) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
A SHOCK TUBE FOR PRODUCING SUBSONIC, TRANSONIC, AND SUPERSONIC FLOWS FOR AERODYNAMIC TESTING,
by R. L. Varwig. 18 Feb 63, 19p. TDR169 3230 11 TN9
Contract AF04 695 169
SSD TDR63 32

Unclassified report

Descriptors: *Shock tubes, Subsonic flow, Transonic flow, Supersonic flow, Aerodynamic characteristics, Measurement, Aerodynamic loading, Tests, Test facilities, Design.

A shock tube is proposed in which the flow conditions between the shock wave and advancing interface are expected to range from low subsonic to moderate supersonic speeds. Furthermore, testing times of 10 msec or more are predicted, a time quite adequate for aerodynamic force measurements. The driven section in the proposed facility is large enough to accommodate large scale models. To test the feasibility of the proposed tube, a shock tube was assembled using a surplus 7-foot diameter vacuum tank as a driven section and 12-in. flanged pipe for the driver. A series of tests were performed to determine shock formation time and experimental testing time. The results of thest tests are reported. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-403 052 Div. 30
(TISTP/JW) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
THE AEROSPACE HYPERSONIC SHOCK TUNNEL.
Status rept.,
by Robert L. Varwig. 21 Feb 63, 15p. TDR169
3230 11TN10
Contract AF04 695 169

SSD TDR6335

Unclassified report

Descriptors: *Hypersonic wind tunnels, Helium, Research program administration, Combustion, Shock waves.

The Aerospace Hypersonic Shock Tunnel is described along with an initial calibration at flow Mach numbers of 12, 14, 17, and 18. Room temperature helium is used as the driver gas. Efforts to drive the shock tunnel with combustion heated helium have been made, and these experiments are also described. (Author)

AD-403 107 Div. 30, 9
(TISTA/LSK) OTS price $13.00

Douglas Aircraft Co. Inc., Santa Monica, Calif.
RESULTS OF INDEPENDENT RESEARCH AND DEVELOPMENT STUDIES BY THE DOUGLAS AEROPHYSICS LABORATORY STAFF IN FLUID MECHANICS AND SIMULATION TECHNIQUES FISCAL YEAR 1962.
Summary of progress for 1962,
ed. by W. E. Smith. 1 Jan 63, 1v. SM41379

Unclassified report

Descriptors: *Hypersonic wind tunnels, Hypersonic flow, Hypersonic characteristics, Boundary layer transition, Heat transfer, Thermodynamics, Conical bodies, Flat plate models, Wind tunnel models, Model tests, Turbulent boundary layer, Combustion, Hypervelocity guns, Transonic wind tunnels, Transonic flow, Visibility, Annular nozzles, Wind tunnel nozzles, Steam, Jet pumps, Schlieren photography, Instrumentation, Scientific research.

Contents:
Experimental work on transition at hypersonic speeds
Hypersonic turbulent heat transfer
Hypervelocity studies using hypervelocity impulse tunnel
Hypervelocity studies using light gas gun and ballistic range
Transonic test section studies
Wind tunnel investigations of a 1/16 scale model of the proposed annular steam ejector for the trisonic four/foot wind tunnel
Hypersonic wind tunnel instrumentation studies
Flow investigations in the hypersonic wind tunnel
Optical flow visualization instrumentation

AD-403 135 Div. 30
(TISTP/MC) OTS price $7.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
THEORETICAL DETERMINATION OF THE IMPEDANCE CHARACTERISTICS OF A CAPACITIVE IONOSPHERE ROCKET PROBE.
by J. R. Herman. 1 Mar 63, 71p. SR 180
Contract AF19 604 8012, Proj. 7663 Task 766301
AFCRL 63 285

Unclassified report

Descriptors: *Electrical conductance, *Ionosphere, *Sounding rockets, Atmospheric sounding, Plasma sheath, Probes (Electromagnetic), Radiosondes, Anisotropy, Electron density.

The impedance characteristics of a capacitive ionospheric rocket probe have been determined as a function of the electron density, collision frequency, and temperature. The physical model used in developing the theory incorporated both effects of the ion sheath which forms about the rocket body and the anisotropic nature of the surrounding magnetoionic medium. Results are obtained and numerically evaluated to show that the sheath makes a very significant contribution to the impedance characteristics. (Author)

AD-403 326 Div. 30, 26
(TISTW/JEA) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
1962-63 TEST SEASON.
6 May 63, 11p.
ATB MR14

Unclassified report

Descriptors: *Army equipment, *Arctic test, Vehicles, Armament, Maintainability, Firing tests (Ordnance), Modification kits, Army research, Clothing, Weapons.

Purpose of this Memorandum Report is to highlight the test activities of the US Army Arctic Test Board, to report on specific problems of supply and maintenance of test and support items, and to furnish general information on the performance of equipment under test. Attempt will be made to acquire and present test information in sufficient detail to enable project engineers and other interested persons to evaluate the progress of each test. (Author)

AD-403 384 Div. 30
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMPUTER-BASED METHODOLOGY FOR SYSTEM DEVELOPMENT SITE PRODUCTION AND REDUCTION SYSTEM,
by E. Newlands and G. L. Grace. 9 Apr 63, 9p.
SP1070

Unclassified report

Presented at the Western Psychological Association Convention, Santa Monica, Calif., 18-20 Apr 1963.

Descriptors: *Adaptive control systems, *Data processing systems, Operations research, Analysis, Bionics, Cybernetics, Design.

Engineers, cyberneticians, and psychologists operationally use similar constructs in the study of systems and living organisms. If the operations performed in the study of constructs are equivalent, then the constructs themselves may be assumed equivalent. Properties exhibited by and methods used for studying living organisms can logically be applied to the study of systems. For systems, synthetic organisms, to learn as do their living counterparts, components similar to the nervous system must be built into them. A biologically modeled system capable of learning requires an afferent subsystem, a locus for cognitive integration, an efferent subsystem, and an integral provision for feedback. As a computer program system SPARS (Site Production and Reduc-

tion System) contains an afferent or exercise subsystem and an efferent or evaluation subsystem. Looking at SPARS as a training control complex, the afferent and efferent subsystems are related circularly to the locus for cognitive integration (the air defense System Training Mission) and to each other by means of system user feedback channels. In the larger sense SPARS functions as a training control complex. Using the design methodology developed in SPARS, synthetic organisms (systems) may be provided the capability to learn. (Author)

AD-403 385 Div. 30
(TISTP/JW) OTS price $2.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Interim research rept. no. 15A, 31 May-31 Aug 62.
31 Aug 62, 21p.
Contract NObsr77523
Unclassified report

Report on High-Speed Data Processor System Research.

Descriptors: *Data processing systems, Electrical equipment, Semiconductors, Computer logic, Digital computers.

During this quarter, combination of the logic and the memory subsystems was effected and the resulting unified subsystem was operated. Several unanticipated problems were recognized and corrected. The electrical grounds used by each subsystem were not common, resulting in a 60-cycle circulating current. The known incompatibility of design between the two subsystems was further eliminated resulting in several decisions concerning future work. Memory fabrication techniques did not allow for accessibility to the lower planes which contributed much to redesign requirements. The two subsystems worked together with the memory operating at a 33-megacycle repetition rate. The 24-bit work line was operated for long periods of time; no difficulties were encountered. (Author)

AD-403 397 Div. 30
(TISTP/JW) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE STORAGE, RETRIEVAL, AND UTILIZATION OF A SERVICE ROUTINE LIBRARY FOR THE RADC CDC 160/160A COMPUTER SYSTEM.
by Frederick A. Normand and Casper R. DeFiore.
Feb 63, 27p.
RADC RAW TM63 2 Unclassified report

Descriptors: *Programming (Computers), Libraries, Information retrieval, Data storage systems.

AD-403 412 Div. 30, 8
(TISTP/JW) OTS price $15.00

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Supplement to interim research rept. no. 15A,
1 Sep 62, 1v. Suppl. to rept. 15A, AD-403 385
Contract NObsr77523
Unclassified report

Report on High-speed Data Processor System Research.

Descriptors: *Data processing systems, Diodes, Electronic equipment, Circuits, Design, Digital computers.

This supplemental report presents material not included in the main cover of Interim Research Report-15A. The main topics are: tunnel device research; the construction of the 40-gate subsystem; and task supporting 'Circuits and Fabrication Completions'. (Author)

AD-403 423 Div. 30, 1
(TISTP/WH) OTS price $15.00

National Aviation Facilities Experimental Center, Atlantic City, N. J.
COMPUTER PROGRAMMING OF PHASE I MASTER PROGRAM. VOLUME I.
Final rept.
by Don W. Vogel, Kenneth W. House, William Brown, Raymond J. Hilton, and Robert B. Stein.
June 62, 1v.
Proj. 104 602T
Unclassified report

Descriptors: *Data processing systems, *Programming (Computers), *Air traffic control systems, *Data transmission systems, *Clocks, Punched tape, Digital systems.

The master program for Phase I flight data processing was developed to provide the maximum benefits for the Phase I systems. It permits the computer to accept and process six different kinds of messages, thus providing the system with the capability of processing semiautomatically any flight plan message received in the prescribed format. The resultant output of the program provides the Air Route Traffic Control Center with printed flight progress strips and the automatic transmission of flight plan estimates to other computer-equipped centers. The outputs are time-controlled by the use of a real-time digital computer clock. The program is capable of handling airway routes and four types of direct routes, and will accept modification messages reflecting data or route changes. In addition, provisions are made for the integration of a controller update program to implement the controller updating equipment. (Author)

AD-403 428 Div. 30
(TISTP/FR) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CONTROL SYSTEMS. ABSTRACTS OF RESEARCH STUDIES.
Mar 63, 37p.
Contract AF19 628 500
AFESD TDR63 51 Unclassified report

Descriptors: *Control systems, Bibliographies, Digital systems, Communication systems, Abstracts.

AD-403 430 Div. 30, 8
(TISTP/FEM) OTS price $4.60

Electronics Research Lab., U. of Calif., Berkeley.
NOTES ON SYSTEM THEORY. VOLUME III.
15 Dec 62, 44p. S60, I491
Contract Nonr22253
Unclassified report

Descriptors: *Adaptive control systems, *Communication theory, Signals, Control systems, Errors, Matrix algebra, Linear systems, Differential equations, Integral equations, Probability, Integral transforms, Design, Sampling.

Contents:
A pitfall in adaptive system design
Calculation of channel capacity
Controllability of systems with time lags
Machines that generate regular Markov chains
Another look at the sampling theorem and its extensions
A note on Fano's inequality

AD-403 435 Div. 30
(TISTM/AW) OTS price $3.60

Linguistics Research Center, U. of Texas, Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 14, 1 Aug-31 Oct 62,
by W. P. Lehmann and E. D. Pendergraft. Nov 62,
37p. 62P14
Contract DA36 039sc78911
Unclassified report

Descriptors: *Machine translation, *Language, Documentation, Theory, Statistical analysis, Computers, Data processing systems.

Progress is reported on the implementation of a computer system to support mechanical translation and other linguistic processes which are potentially applicable to scientific documentation. The system contains three sections: one for control, a second for language data processing, and a third for linguistic information processing. The first is now operational, and the second will be so in the next quarter. The third is now being developed at the level of syntactic analysis. (Author)

AD-403 451 Div. 30
(TISTW/JEA) OTS price $3.60

System Development Corp., Santa Monica, Calif.
SOFTWARE DESIGN AND IMPLEMENTATION,
by J. W. Singleton. 4 Mar 63, 29p. SP1092
Unclassified report

Descriptors: *Command and control systems, *Programming (Computers), Feasibility studies, Specifications, Job analysis, Effectiveness, Costs, Computers, Design.

A synthesis of System Development Corporation's accumulated experience in the field of command and control software development is presented. Research shows that software design and implementation is deserving of the best professional resources, and concludes that while the software development process is complex, it has yielded to orderly description and management and that relevant knowledge and skills exist that can be used to increase our understanding, competence, and control over this critical portion of the job of creating military command and control system. (Author)

AD-403 484 Div. 30, 1
(TISTP/WH) OTS price $3.00

Federal Aviation Agency, Atlantic City, N. J.
COMPUTER PROGRAMMING OF PHASE I MASTER PROGRAM.
VOLUME III. APPENDIX X THROUGH APPENDIX XXI.
Final rept.,
by Don W. Vogel, Kenneth W. House, William Brown, Raymond J. Hilton, and Robert B. Stein.
June 1962, 1v.
Proj. 104 602T
Unclassified report

Descriptors: *Data processing systems, *Programming (Computers), *Air traffic control systems, *Data transmission systems, *Typewriters, Digital computers.

AD-403 495 Div. 30, 1
(TISTP/WA) OTS price $8.60

Federal Aviation Agency, Atlantic City, N. J.
COMPUTER PROGRAMMING OF PHASE I MASTER PROGRAM.
VOLUME II. APPENDIX II THROUGH APPENDIX IX.
Final rept.,
by Don W. Vogel, Kenneth W. House, William Brown, Raymond J. Hilton, and Robert B. Stein.
June 62, 1v.
Proj. 104 602T
Unclassified report

Descriptors: *Data processing systems, *Programming (Computers), *Air traffic control systems, *Clocks, Data transmission systems, Digital systems.

31. SHIPS AND MARINE EQUIPMENT

AD-402 601 Div. 31, 30
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE QUALITY OF FILLING FLOATING GYROSCOPIC INSTRUMENTS WITH A SPECIAL LIQUID,
by Z. F. Urazayev and V. Yu. Shishmarev.
28 Mar 63, 11p.
FTD TT63 148
Unclassified report.

Trans. from Russian Book, Nekotorye Voprosy Sovremennoy Tekhnologii Priborostroyeniya, Trudy No. 52, Moskovskiy Aviatsionnyy Tekhnologicheskiy Institut, pp. 52-60, 1961.

Descriptors: *Gyroscopes, Quality control, Instrumentation, Liquids, Reliability.

AD-402 678 Div. 31
(TISTP/PCR) OTS price $17.00

Office of Naval Research, Washington, D. C.
A STUDY OF THE OPERATIONAL FEASIBILITY OF THE GROUND EFFECT MACHINE IN THE AMPHIBIOUS SUPPORT MISSION. APPENDIXES.
Naval Analysis rept.
Nov 62, 262p. ACR/NAR26, Appendixes
Unclassified report

Descriptors: *Ground effect machines, *Amphibious vehicles, *Hydrofoil boats, Cargo, Propulsion, Drag, Weight, Stability, Control systems, Costs, Programming (Computers), Mathematical models, Landing craft, Maintenance, Photographs, Pictures, Feasibility studies, Amphibious operations, Cargo vehicles, Cargo ships.

Contents:
Characteristics of GEMs and other transfer vehicles
Preliminary analysis for the purpose of defining the characteristics of GEMs and other transfer vehicles to be considered in the analysis of the ship to shore movement
Recent advances applicable to amphibious and related equipment
Notes on propulsion, drag, structural weights, stability and control
Costing methodology
Cargo handling in ships and vehicles
Computer programs to simulate landing operations and analyze vehicles and shipping

AD-403 060 Div. 31
(TISTE/CRJ) OTS price $17.50

Materials and Chemical Labs., Boston Naval Shipyard, Mass.
COLLECTION OF REPORTS ON VIBRATION SURVEYS.
1962, 267p.
Unclassified report

Descriptors: *Aircraft carriers, *Cruisers, *Destroyer escorts, *Destroyers, *Frigates, *Picket ships, *Transports, *Icebreakers, *Tugs, Ship noise, Shipborne, Acoustic impedance, Measurement, Generators, Blowers, Ship hulls, Shafts, Steam turbines, Motor generators, Pumps, Ventilation fans, Compressors, Vibration.

AD-403 336 Div. 31
(TISTE/JBM) OTS price $8.60

RAND Corp., Santa Monica, Calif.
WEIGHT, COST AND DESIGN CHARACTERISTICS OF TANKERS AND DRY CARGO SHIPS,
by Roger P. Johnson and Henry P. Rumble. Apr 63, 86p. RM3318PR
Contract AF49 638 700
Unclassified report

Descriptors: *Cargo ships, *Tankers, Cargo, Velocity, Ranges (Distance), Equations, Configuration, Shafts, Power, Statistical functions, Analysis, Ship hulls, Steel, Ship auxiliary equipment, Ship structural components, Costs, Weight.

A simple method of obtaining a first-order estimate of the displacement and cost of tankers and dry cargo ships, as a function of payload, speed, and range is presented. The two characteristics of primary interest to system analysts, displacement and cost, are summarized as a function of payload and speed by a single graph each for tanker ships and two types of dry cargo ships. The components of weight and cost are developed from a series of design charts and simple equations. More detailed characteristics of the ship, including length, block coefficient, shaft horsepower, weight of steel, outfit, and machinery, are also presented as well as the primary elements of material and labor costs associated with the last three items. Supporting data and an example of use of the method is presented. (Author)

AD-403 440 Div. 31
(TISTE/CAM) OTS price $8.10

Portsmouth Naval Shipyard, N. H.
SUPPLEMENTARY REPORT ON THE DEVELOPMENT OF ANALYSIS TECHNIQUES FOR SUBMARINE MACHINERY INSTALLATIONS BY MECHANICAL IMPEDANCE METHODS.
Technical rept.,
by J. E. Smith. Mar 63, 78p.
Proj. S F013 11 01, Task 1352
PNS T819 029 Unclassified report

Descriptors: *Machines, *Submarines, Statistical analysis, Acoustic impedance, Errors, Experimental data, Vibration.

AD-403 480 Div. 31
(TISTE/PAR) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
CALCULATED NATURAL VERTICAL HULL FREQUENCIES AND NORMAL MODES OF SURVEYING SHIP AGS 26,
by John T. Cummings. Mar 63, 15p.
DTMB 1704
Unclassified report

Descriptors: *Ship hulls, *Oceanographic vessels, Digital computers, Hulls, Naval vessels (Support), Mathematical analysis, Resonance, Ship models, Model basins, Vibration, Moments, Model tests.

The normal mode shapes, natural frequencies, and bending moment distribution of vertical flexural vibration of the hull were calculated for the AGS 26, a Surveying Ship. Parameters used in calculations with a digital computer are tabulated. The two-noded vertical natural frequency obtained with the computer agrees closely with that calculated using the Burrill empirical formula. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-402 597 Div. 32, 30
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INFORMATION MACHINE,
by L. I. Gutenmakher. 2 Apr 63, 8p.
FTD TT63 221
Unclassified report

Trans. from Ekonomicheskaya Gazeta, No. 37, pp. 26-27, 8 Sep 62.

Descriptors: *Information retrieval, Digital computers, Computer storage systems.

An electronic digital machine designated for automating the processes of storage, search and logical processing of large volumes of information is discussed. Such a machine has extremely capacious intrinsic and extrinsic memory devices. Information machine installations basically perform logic operations (approximately 90%) and a small number of arithmetical ones (about 10%). It is used for processing statistical information concerning the national economy, search and logical processing of scientific and technical information, treatment of medical observations for refining and generalizing symptoms of an illness and methods for curing, for processing observations of natural phenomena (meteorological, seismic, cosmic, etc.). (Author)

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-402 910 Div. 32
(TISTB/AW) OTS price $2.75

Naval Research Lab., Washington, D. C.
BIBLIOGRAPHY OF UNCLASSIFIED NRL FORMAL REPORTS NUMBERS 1000 TO 5700.
July 62, 145p.
NRL 5700B

Unclassified report

Descriptors: *Bibliographies, *Naval Research Laboratories, Naval research.

AD-402 917 Div. 32
(TISTB/AW) OTS price $8.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
ORGANIZATION AND PRESENTATION OF ENVIRONMENTAL DATA FOR OFFICE OF CIVIL DEFENSE USE,
by D. D. Smith and R. T. Saucier. Apr 63, 1v.
TR5 622

Unclassified report

Report on a feasibility study.

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Documentation, *Communication systems, Geological survey, Identification, Data, Data processing systems, Military requirements, Geography, Radioactive fallout, Shelters, Feasibility studies, Mapping, Civil engineering, Civil defense systems.

An appraisal of the status of existing environmental data held by the major cognizant Federal and state agencies indicates that voluminous, unpublished data in various stages of processing exist for all pertinent categories of information. The data are generally filed in local, state, or regional offices, and the practical difficulties in obtaining such information are significant. Adequate fulfillment of OCD environmental data requirements centers around establishing an effective organization structure which will facilitate communication and transfer of information from data sources to the user-in short, setting up a suitable information system. Recommendations are made for establishing a three-part information system which would consist of (a) an OCD Staff Coordinator for Environmental Information who would be a professional earth scientist, (b) a Board of Expert Advisers representing pertinent environmental disciplines, and (c) a directory of Federal, state, and other important environmental data sources. (Author)

AD-402 990 Div. 32
(TISTB/AW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
A NOTE ON SOME NOXIOUS ALTERNATIVES,
by Allen R. Ferguson. Feb 63, 4p. P2710

Unclassified report

Descriptors: *Costs, *Nuclear warfare, Decision making, Probability.

Whatever one believes about the worst not-obviously-absurd consequences, it seems clear that the lower ranges of reasonable physical cost to the United States of an American first strike are far less than those of a Russian first strike. Further, one might compare the expected costs of a United States first strike with those of a Soviet first strike under optimistic, neutral and pessimistic assumptions. In anything like present conditions, the expected costs under the neutral and optimistic assumptions would be less in the case of a United States initiation than in the case of a Soviet first strike. (Author)

AD-402 992 Div. 32
(TISTB/AW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME SUGGESTED CHANGES IN RESEARCH AND DEVELOPMENT STRATEGY AND THEIR IMPLICATION FOR CONTRACTING,
by Thomas K. Glennan, Jr. Mar 63, 14p. P2717

Unclassified report

Descriptors: *Air force procurement, *Research program administration, Armed forces procurement, Costs, Armed forces budgets, Weapon systems.

AD-403 112 Div. 32, 30
(TISTA/LSK) OTS price $15.00

Air Force Systems Command, Washington, D. C.
QUARTERLY INDEX AND ABSTRACTS OF TECHNICAL DOCUMENTARY REPORTS.
Quarterly rept. no. 4.
1962, 221p.

Unclassified report

Descriptors: *Air force research, *Air force systems command, Scientific research, Reports, Bibliographies, Indexes, Abstracts.

AD-403 348 Div. 32
(TISTB/AW) OTS price $2.60

Rand Corp., Santa Monica, Calif.
PRICE BEHAVIOR UNDER ALTERNATIVE FORMS OF PRICE EXPECTATIONS,
by George S. Fishman. Apr 63, 27p. P2741

Unclassified report

Descriptors: *Economics, Time, Statistical processes, Analysis of variance, Industrial production, Theory, Series, Costs.

The components of the variance of price are analyzed. In the models considered, a price process is assumed to be evolving through time. It is composed of fluctuations of different lengths of time. The relative importance of these fluctuations in shaping the over-all process may show how well a particular model leads to the price behavior commonly observed. This elaboration will extend the traditional synthesis by means of the theory of stationary time series, or more precisely, the spectral representation of such series. Questions to be answered are, for example: What is the relative importance of fluctuations of different lengths of time in the price process. How will reducing the production period affect price. How influential are price expectations on price. Attention is restricted to situations wherein temporary shifts in economic phenomena are dominant over permanent changes in the economic structure. This focus precludes any change in the equilibrium price and, therefore, simplicity dictates that deviation from equilibrium only be considered. (Author)

33. TRANSPORTATION

AD-402 991 Div. 33
(TISTB/AW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
HAVE WE LEARNED ANYTHING FROM TRANSPORTATION STUDIES,
by Edward F. R. Hearle. May 63, 10p. P2740
Unclassified report

Descriptors: *Transportation, Mathematical models, Bibliographies, Urban areas.

AD-403 075 Div. 33, 1
(TISTA/LSK) OTS price $11.50

Federal Aviation Agency, Atlantic City, N. J.
STUDIES IN THE FIELD OF APPROACH VISIBILITY MEASUREMENT AND INSTRUMENTATION.
Final rept.
Apr 62, 137p.
Contract FAA/BRD A51, Proj. 202 2 1X
Unclassified report

In cooperation with Weather Bureau, Washington, D. C.

Descriptors: *Airplane landings, *Instrument landings, *Approach lights, Marker lights, All weather aviation, Landing aids, Visibility.

Studies were conducted and developmental work performed in the field of approach visibility measurements, instrumentation, and application to aircraft instrument landing operations, at the National Aviation Facilities Experimental Center, Atlantic City, New Jersey. Flight tests were conducted to refine the approach light contact height (ALCH) techniques developed empirically at Newark and confirm their more general applicability to other locations, types of aircraft and operational conditions. It was determined that ALCH for low clouds was substantially the same at Atlantic City as at Newark. Limited data for ALCH, HF category (fog, smoke, and haze), permitted the general appraisal that this category also showed marked similarity. Studies indicated that automatic control of runway and approach lights is feasible, and a design was developed for optimum intensity of these lights with regard to varying weather conditions. Four simultaneously operating transmissometers were installed along runway 13-31 to measure variations of transmittance with time and space. Statistical studies were made of the data. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are listed in the subject index.

BIBLIOGRAPHY

UCRL-5705(suppl. 2) OTS $4.50

Lawrence Radiation Lab., U. of California, Livermore.
CURRENT BERYLLIUM LITERATURE: A SELECTED BIBLIOGRAPHY, JANUARY 1961-DECEMBER 1962. Rept. on Contract W7405-eng-48. Jan 63, 351p. NASA N63-14597.

UCRL-7160 OTS $4.00

Lawrence Radiation Lab., U. of California, Livermore.
HIGH-PRESSURE EQUATION OF STATE BIBLIOGRAPHY AND INDEX, by Stephen G. Brush, Rose Kraft, and Jean Senkin. Rept. for 1925-1962, on Contract W7405-eng-48. 22 Jan 63, 206p. NASA N63-15654.

AGRICULTURE

ORO-598 OTS $2.50

Agricultural Research Lab., U. of Tennessee, Oak Ridge.
AGRICULTURAL RESEARCH. Semi-annual progress rept. for 1 Jan-30 June 62 on Contract AT 40-1-GEN-242. Mar 63, 121p. 11 refs.

NASA N63-11540 OTS $1.60

Argonne National Lab., Ill.
GROWTH AND DEVELOPMENT OF PLANTS IN COMPENSATED GRAVITATIONAL, MAGNETIC, AND ELECTRICAL FIELDS, by Solen A. Gordon and Jane Shen Miller. Rept. on NASA Order R-46. 14 May 63, 14p.

ASTRONOMY

Astrophysics

NASA N63-12618 OTS $1.60

Advanced Kinetics, Inc., Costa Mesa, Calif.
LABORATORY SIMULATION STUDIES OF OUTER SPACE PHENOMENA, by Ralph W. Waniek. Quarterly status rept. on Contract NASw-427. [1963] 14p. 1 ref. 11 Oct 62-12 Jan 63

NASA N63-12071 OTS $1.10

Boston U., Mass.
IMPACTS ON THE EARTH AND MOON, by Gerald S. Hawkins. Rept. on Grant NsG-246-62. Nov 62, 7p.

NASA N63-12041 OTS $1.60

Boston U., Mass.
THE PLATE CONSTANTS OF MOON PHOTOGRAPHS, by Badri Aghassi. Research rept. no. 2, on Grant NsG-246-62. Sep 62, 12p. 3 refs.

BNL-779 OTS $0.50

Brookhaven National Lab., Upton, N. Y.
THE HISTORY OF COSMIC RAYS AND METEORITES, by Oliver A. Schaeffer. Brookhaven lecture series no. 8. 14 June 61, 11p. BNL-T-295.

NASA N63-15042 OTS $2.60

Cantebury U., Christchurch, (New Zealand).
THE DISTRIBUTION OF METEORS AROUND THE EARTH'S ORBIT, by C. S. L. Keay. Rept. on Grant NsG-219-62. 18 Feb 63, 30p. 22 refs.

NASA N63-14713 OTS $12.50

General Electric Co., Space Sciences Lab., Philadelphia, Pa.
EXPERIMENTAL PLANETARY ENTRY RESEARCH FOR MARS AND VENUS - 1962, by T. K. Pugmire. Rept. on Contracts NAS7-100 and Contract AF 49(638)931. Oct 62, 175p. 40 refs. R62SD84; AFOSR-4634.

NASA N63-13843 OTS $8.10

Geophysics Corp. of America, Bedford, Mass.
THE METEOROLOGY OF MARS AND VENUS, by George Ohring and Owen Cote'. Annual tech. rept. on Contract NASw-286, Jan 63, 89p. 52 refs. GCA Technical rept. no. 63-6-N.

NASA N63-14901 OTS $1.10

High Altitude Observatory, Boulder, Colo.
WHITE-LIGHT VS. NARROW-BAND OBSERVATIONS OF THE POLARIZATION OF THE ZODIACAL LIGHT, by J. L. Weinberg (Colorado U.) Rept. on Grants NsG-15-59 and NsG-135-61. 1 Apr 63, 9p. 2 refs.

NASA N63-12077 OTS $3.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
SOLAR RADIO NOISE. PART II. TYPE III BURSTS, by T. J. M. Boyd. Rept. on Grant NsG-220-62. June 62, 32p. 56 refs. BN-290.

NASA N63-12078 OTS $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
SOLAR RADIO NOISE. PART III. TYPE IV BURSTS, by T. J. M. Boyd. Rept. on Grant NsG-220-62. Aug 62, 25p. 33 refs. BN-291.

NASA N63-12777 OTS $1.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
THE VISIBILITY OF STARS (CALCULATED FROM THE TIFFANY DATA). by Arthur C. Hardy. Rept. on Contract NAS9-153. June 62, 11p. E-1172.

NASA N63-13704 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ASTRONAUTICS INFORMATION. MEASUREMENT OF GAMMA RADIATION, comp. by Dorothy Sweitzer. Rept. on Contract NASw-6. 1 Mar 61, 37p. 166 refs. JPLAI/LS-205.

NASA N63-14677 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PHOTOGRAPHY OF THE MOON FROM SPACE PROBES, by Manfred Eimer, Rept. on Contract NAS7-100, 15 Jan 63, 26p. 17 refs. JPL TR-32-347.

NASA N63-12043 OTS $3.60

New Mexico U. Engineering Experiment Station, Albuquerque.
LUNAR SURFACE CHARACTERISTICS BASED ON RADAR AND PHOTOGRAPHIC DATA, by Donald H. Lenhert, W. W. Koepsel and others. Semi-annual progress rept. on Grant NsG-129-61. Oct 62, 38p. PR-39.

NASA N63-12040 OTS $2.60

Rand Corp., Santa Monica, Calif.
SOME ASPECTS OF THE SURVEY OF THE MAGNETIC FIELD OF THE MOON AND THE PLANETS, by E. H. Vestine. Rept. on Contract NASr-21(05). Dec 62, 23p. 18 refs. Memo. RM-3140-NASA.

NASA N63-11407 OTS $1.60

Rand Corp., Santa Monica, Calif.
STUDIES OF THE PHYSICAL PROPERTIES OF THE MOON AND PLANETS. Quarterly technical progress rept. 8, 1 Apr-30 June 62, on Contract NAS7-100. July 62, 12p. 4 refs. AR-26-JPL.

NASA N63-13845 OTS $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MARINER -2 MICROWAVE OBSERVATIONS OF VENUS, by Alan H. Barrett and A. Edward Lilley (Harvard Coll. Observatory). Rept. on Grant NsG-250-62. [1963] 9p.

BEHAVIORAL SCIENCES

AD-402 386 repriced OTS $2.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
A BIBLIOGRAPHY OF REPORTS ISSUED BY THE BEHAVIORAL SCIENCES LABORATORY: ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY - 1946-1962, comp. by L. Jean Thomas. Mar 63, 115p. 907 refs. NASA N63-15966.

DESCRIPTORS: *Human engineering, *Training, *Control systems, *Display systems, Anthropometry, Simulation, Maintenance, Training devices, Stress (Psychology), Tracking, Weightlessness, Design, Models (Simulations), Bibliographies, Military requirements.

BIOLOGICAL SCIENCES

NASA N63-11127 OTS $2.60

Armour Research Foundation, Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS, by Charles A. Hagen and E. J. Hawrylewicz. Quarterly status rept. 15 Aug-15 Nov 62, on Contract NASr-22. [1962] 28p. 7 refs. ARF 3194-7.

NASA N63-12796 OTS $1.10

Corbin-Farnsworth, Inc., Palo Alto, Calif.
PROPOSAL FOR STUDY AND DEVELOPMENT OF REMOTE BLOOD PRESSURE MEASURING SYSTEM. Quarterly rept. no. 1 on Contract NASw-493. 15 Dec 62, 5p.

UCRL-10634 OTS $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
BIO-ORGANIC CHEMISTRY. Quarterly rept., Sep-Nov 62, on Contract W7405-eng-48. 18 Jan 63, 123p. 13 refs. NASA N63-14631; includes NASA N63-(14632-14636)

NASA N63-11192 OTS $2.60

Maryland U., College Park.
INJURY AND RECOVERY OF PHOTOSYNTHESIS IN CELLS OF SUCCESIVE DEVELOPMENTAL STAGES: TEMPERATURE EFFECTS, by Constantine Sorokin. Rept. on Grant NsG-70-60. [1961] 27p. 16 refs.

NASA N63-15250 OTS $2.60

Melpar, Inc., Falls Church, Va.
RESEARCH ON DETECTION OF EXTRATERRESTRIAL LIFE BY ULTRAVIOLET SPECTROPHOTOMETRY, by Sol S. Nelson. Quarterly progress rept. no. 1, 1 Jan-31 Mar 63 on Contract NASw-571. [1963] 23p. 3 refs.

NASA N63-12825 OTS $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
CONDUCT RESEARCH ON THE EFFECT OF VERY STRONG FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS, by D. E. Belscher. Progress rept. 1 Nov 61-3 Jan 62, on Order no. R-39. 29 Jan 62, 3p.

NASA N63-12356 OTS $1.10

Northrop Space Labs., Hawthorne, Calif.
BIOLOGICAL AND PHYSIOLOGICAL STUDIES OF PEROGNATHUS (POCKET MICE), by R. G. Lindberg and D. F. Mitchell. Quarterly status rept. no. 3, 1 Sep-30 Nov 62, on Contract NASr-91. [1962] 10p. 8 refs. NSL 62-125-2.

AD-402 638 OTS $5.00

Science and Technology Div., Library of Congress, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. FORMERLY: AVIATION MEDICINE. AN ANNOTATED BIBLIOGRAPHY. VOLUME VI - 1957 LITERATURE, by Arnold J. Jacobius, Roman Kenk and others. 1963, 365p. 1566 refs, NASA N63-15258.

DESCRIPTORS: *Bibliographies, *Abstracts, *Ecology, *Physiology, Sensory mechanisms, *Psychology, *Psychiatry, Stress (Psychology), Personnel, *Pharmacology, Toxicity, Safety, Accidents, *Human engineering, *Space medicine, Biology, *Aviation medicine, Space biology

See also AD-274 064

NASA N63-12632 OTS $8.10

Space Sciences Lab., U. of California, Berkeley.
BIOLOGICAL SYSTEMS IN INTERPLANETARY ENVIRONMENT, ed by John V. Slater. Final status rept. on Grant NTF-74 and Nsg-94-60. 1 Sep 62, 87p. 50 refs. Series no. 3, issue no. 25.

Radiobiology

ANL-6688 OTS $1.00

Argonne National Lab., Ill.
A REVIEW OF THE ARGONNE NATIONAL LABORATORY RADIATION EXPOSURE EXPERIENCE FOR THE YEARS 1959-1961, by Pete Tedeschi. Rept. on Contract W31-109-eng-38. Feb 63, 38p. 1 ref.

LF-6 OTS $0.75

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
OPERATING CHARACTERISTICS OF THE LAUTERBACH AND DAUTREBANDE AEROSOL GENERATORS, by T. T. Mercer, M. I. Tillery, and M. A. Flores. Rept. on Contract AT(29-2)1013. Feb 63, 32p. 8 refs. NASA N63-14665.

IDO-16851 $0.50

Phillips Petroleum Co., Idaho Falls.
ORGANIC COOLANT DEGRADATION STUDIES, by D. G. Kuper. Rept. on Contract AT(10-1)205. 25 Mar 63, 12p. 2 refs. NASA N63-15542.

Analytical Chemistry

NASA N63-10549 OTS $1.60

General Electric Co., Cincinnati, Ohio.
RESEARCH ON ANALYTICAL METHODS FOR OXYGEN IN LIQUID ALKALI METALS, by Hyman Kirtchik and George Riechmann. Quarterly progress rept. no. 7, 1 July-30 Sep 62, on Contract NASr-12. 15 Oct 62, 13p. 2 refs. DM-62-238.

UCRL-7165 OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
A CONTROLLED-POTENTIAL COULOMETER, by F. B. Stephens, J. E. Harrar. Rept. on Contract W7405-eng-48. 21 Jan 63, 14p. 13 refs. NASA N63-15092.

UCRL-7204 OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
THE DETERMINATION OF SULFUR IN BERYLLIUM OXIDE AND SINTERED BERYLLIUM OXIDE FUEL ELEMENTS, by Walter G. Boyle, Jr., Lewis J. Gregory, and William Sunderland. Rept. on Contract W7405-eng-48. 16 Jan 63, 11p. 7 refs. NASA N63-14598.

NBL-194 OTS $0.50

New Brunswick Lab., N. J.
THE MEASUREMENT OF M/E POSITIONS FOR A MASS SPECTROMETER USING A ROTATING COIL GAUSSMETER, by Hugh O. Finley and Ralph J. Hemmer. Apr 63, 16p. 2 refs. NASA N63-15551.

NBL-191 OTS $0.75

New Brunswick Lab., N. J.
A VERSATILE SIX-INCH RADIUS MASS SPECTROMETER FOR ISOTOPIC ANALYSIS OF SOLIDS, LIQUIDS, OR GASES, by H. O. Finley, R. J. Hemmer, and L. C. Nelson, Jr. Apr 63, 38p. 4 refs. NASA N63-14644.

ORNL-3397 OTS $2.75

Oak Ridge National Lab., Tenn.
ANALYTICAL CHEMISTRY DIVISION. Annual progress rept. for period ending 31 Dec 62, on Contract W7405-eng-26. 1962. 172p. NASA N63-12657.

NASA N63-12650 OTS $3.60

Texas A. and M. Coll., College Station.
NUCLEAR ACTIVATION ANALYSIS. RECENT DEVELOPMENTS IN THE TECHNIQUE, AND ITS INHERENT ATTRIBUTES GIVE PROMISE OF WIDE APPLICABILITY, by Richard E. Wainerdi. Rept. on Grant NsG-256-62. [1962] 31p. 48 refs.

Y-1415 OTS $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A PLUG-IN-TYPE MASS SPECTROMETER SURFACE IONIZATION SOURCE FOR USE WITH A VACUUM LOCK, by W. W. Rice. Rept. on Contract W7405-eng-26. 29 Jan 63, 15p. 6 refs. NASA N63-14793.

Y-1414 OTS $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A VERSATILE SPECTROMETER MAGNET POWER SUPPLY, by W. A. Groppe. Rept. on Contract W7405-eng-26. 25 Jan 63, 25p. NASA N63-14792.

Physical Chemistry

PB 163 114 OTS $1.60

Boston U., Mass.
THERMODYNAMICS OF SODIUM TETRAMETHOXYBORATE AND TETRAMETHOXYBORATE ION, by L. V. Coulter and J. R. Sinclair. [Rept. on Subcontract to Contract NOas-52-1024-c] 6 May 57, 14p. 6 refs. Rept. no. CCC-1024-TR-240; AD-138 097.

DESCRIPTORS: *Complex compounds, *Organoboranes, *Sodium compounds, Alkoxy radicals, *Borates, Ions, *Thermodynamics, Entropy, Heat of solution, Solvents, Ammonia

The heat capacity of sodium tetramethoxyborate has been determined from 14° to 300°K by means of an adiabatic calorimeter. At 298.15°K the entropy was found to be 68.60 cal. deg.$^{-1}$ mole^{-1}; the heat content ($H^{o} - H_{0}^{o}$), 1037 cal. mole^{-1}; and the heat capacity, 54.70 cal. deg^{-1} mole^{-1}. The heat of solution in liquid ammonia at -33°C was found to be 0.0 kcal. ±1 kcal. For the solution reaction of solid sodium tetramethyoxyborate in liquid ammonia at -33°, ΔF^{o} =4.1 kcal. and ΔS^{o} = -17 ±3 cal. deg.$^{-1}$ mole^{-1}. Relative to $S^{o}[H^{+}(am)] = 0$ in liquid ammonia at 33°C, $S^{o}[B(OCH_3)_4(am)]$ = 28 ±3 cal. deg.$^{-1}$ mole for the tetramethoxyborate ion in the hypothetical one molal solution. (Author)

NASA N62-17486 OTS $11.50

Johns Hopkins U., Baltimore, Md.
GRAPHITE OXIDATION AT LOW TEMPERATURE, by H. E. Hoelscher, and E. Effron. Rept. on Grant NsG-42-60. Sep 62, 155p. 100 refs.

NASA N63-12806 OTS $2.60

National Bureau of Standards, Washington, D. C.
PYROLYSIS OF NEW FLUOROPOLYMERS, by Sidney Straus and Leo A. Wall. Rept. on NASA Order R-56. [1962] 26p. 19 refs.

NASA N63-12707 OTS $2.60

National Bureau of Standards, Washington, D. C.
PYROLYSIS OF POLYTRIFLUOROETHYLENE: INFLUENCE OF GAMMA RADIATION AND ALKALI TREATMENT, by Sidney Straus and Leo A. Wall. Rept. on NASA Order R-56. [1962] 24p. 11 refs.

ORNL-3278 OTS $0.50

Oak Ridge National Lab., Tenn.
HYDROLYSIS OF U(VI): ACIDITY MEASUREMENTS IN CHLORIDE SOLUTIONS AND ABSORPTION SPECTRA IN CHLORIDE AND PERCHLORATE SOLUTIONS, by R. M. Rush, J. S. Johnson, and K. A. Kraus. Rept. on Contract W7405-eng-26. 1962. 15p. 16 refs.

NASA N63-12617 OTS $1.10

William Marsh Rice U., Houston, Tex.
A HIGH TEMPERATURE CALORIMETER: THE ENTHALPIES OF α-ALUMINUM OXIDE AND SODIUM CHLORIDE, by Rapier Dawson, Elizabeth B. Brackett, and Thomas E. Brackett. Rept. on Grant NsG-6-59. [1961] 10p. 8 refs.

NASA N63-12829 OTS $2.60

William Marsh Rice U., Houston, Tex.
HYDRATES AT HIGH PRESSURES. METHANE-WATER AND ARGON-WATER SYSTEMS, by Donald R. Marshall and Riki Kobayashi. Rept. on Grant NsG-6-59. 15 Jan 62, 25p. 17 refs.

EARTH SCIENCES

NASA N63-15301 OTS $2.60

California U., La Jolla. School of Science and Engineering.
ELECTRON MICROPROBE ANALYSIS OF SOME RARE MINERALS IN THE NORTON COUNTY ACHONDRITE, by Klaus Keil and Kurt Fredriksson. Rept. on Grant NsG-322-63. [1963] 28p. 21 refs.

NASA N63-12649 OTS $2.60

Southwest Center for Advanced Studies, Dallas, Tex.
INTERPRETATION OF K_p INDEX AND M-REGION GEOMAGNETIC STORMS, by A. J. Dessler and J. A J. A. Fejer. Rept. on Grant NsG-269-62. 24 Jan 63, 21p. 27 refs.

PB 163 165 OTS $4.60

Cloud Physics Lab., U. of Chicago, Ill.
PHLOROGLUCINOL SEEDING OF UNDERCOOLED CLOUDS, by Roscoe R. Braham, Jr. Technical note no. 26 on National Science Foundation Grant G-22419. 1 Apr 63, 48p. 5 refs; NASA N63-15787.

DESCRIPTORS: *Benzenes, *Alcohols, *Artificial precipitation, *Clouds, Ice, Atmosphere, Tests, Experimental data, Meteorology, Reagents, Stratus clouds, Organic compounds

A series of twelve releases of phloroglucinol were made into stratus clouds at temperatures of -7C to -17C. Showers produced by dry ice seeding were used to identify particular spots in the layer clouds from which the exact locations of the phloroglucinol releases could be obtained by simple navigation. Visual observations of the cloud behavior and Formvar replicas of cloud and precipitation particles provided a means for judging the effects of the phloroglucinol seeding. It is concluded that phloroglucinol will induce the formation of ice in undercooled clouds. However, in these experiments it was not nearly as effective as the dry ice in causing shower formation. (Author)

Geology

TID-18125 OTS $0.75

Dresser Research, Tulsa, Okla.
ACTIVATION ANALYSIS OF OCEAN BOTTOM CORES, by Paul Kehler and Ralph Monaghan. Rept. on Contract AT(40-1)2969. Nov 62, 18p.

NASA N62-15578 OTS $3.60

Mellon Inst. [of Industrial Research] Pittsburgh, Pa.
FOSSIL GLASSES PRODUCED BY IMPACT OF METEORITES, ASTEROIDS AND POSSIBLY COMETS WITH THE PLANET EARTH, by A. J. Cohen. Rept. on Grant NsG-57-60. [1962] 32p. 30 refs.

Physics of the Atmosphere

NASA N63-10685 OTS $5.60

Iowa State U., Iowa City.
STUDY OF ENERGETIC ELECTRONS AND THEIR RELATIONSHIP TO AURORAL ABSORPTION OF RADIO WAVES, by B. Maehlum and B. J. O'Brien. Rept. on Grant NsG-233-62 and Contract N9onr-938(03). [1962] 52p. 32 refs. SUI 62-23-B.

NASA N63-12357 OTS $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
A METHOD FOR THE DETERMINATION OF HIGH-ALTITUDE WATER-VAPOR ABUNDANCE FROM GROUND-BASED MICROWAVE OBSERVATIONS, by A. H. Barrett and V. K. Chung. Rept. on Contract NASr-101 and Grant NsG-250-62. [1962] 22p. 19 refs.

Also available in J. Geophysical Research, 1962, v. 67, no. 11, p. 4259-4266. (NASA N63-10459)

PB 181 500 OTS $0.50

Bureau of Ships, Washington, D. C.
SHOP PRACTICE SUGGESTIONS [NO. 7] May 63, 23p.

DESCRIPTORS: *Ships, Maintenance, *Machine shop practice, Tanks (Containers), Seals (Stoppers), Valves, Dies, Optical equipment, Steam turbines, Heaters, Distributors, Junction boxes, Infrared domes, Grinders, Ventilation ducts, Connecting rods, Pipe fittings, Ship plates, Templates, Refrigeration systems, Pumps, Hydrophones, Sprinklers, Paint removers, Hatches, Generators, Cutting tools, Micrometers, Nozzles, Cables (Mechanical), Expansion joints, Bearings, Protective coverings, Guided missile launchers, Propellers (Marine), Saws, Hoists

Suggestions included are: Hand holds for tank manholes; acrylic sealer for radium dials; removing corrosion rings from sea valves; quick change die set; optical alinement; main engine steam turbine diaphragm; temporary vent heaters; distribution manifold; relay and junction box covers; modification of infrared hoods; portable facing machine; watertight vent cover fasteners; rudder operating connecting rods; flaring tool; pipe clamps; fabrication of chafing rings; layoff for perforated plating; templates for frame openings; refrigerant system cleaner; shipboard draft reading rule; die for stack bands; improved pumping facilities; hydrophone insulation and waterproofing; sprinkling control valve test; paint remover; filter housing access door; new manual available; generator positioning assemblies; carbide tips for tile cutting; micrometer adjustment for instruments; ship gangways; radial track for cutting machines; nozzle control valve adjustment; cable marker production; pre-formed expansion joints; wheel guard cover plate; rebabbitting bearings; identifying grinding wheels; missile loading rail; color-coding fuel oil burner valves; main wireway supports; propeller handling skid; table saw guard; bin lifting and moving frames; altered stoning rig.

NASA N63-12138 OTS $2.60

National Aeronautics and Space Administration, Washington, D. C.
STATEMENT [ON AERONAUTICAL RESEARCH PROGRAM] BEFORE THE SUBCOMMITTEE NO. 2, COMMITTEE ON SCIENCE AND ASTRONAUTICS, HOUSE OF REPRESENTATIVES, by John Stack. 19 Oct 62, 29p.

Chemical Engineering

NASA N63-14899 OTS $1.60

Air Products and Chemicals, Inc., Allentown, Pa.
JOULE-THOMSON NEON LIQUEFIER, by Abraham Lapin. Rept. on Contract NASr-107. [1963] 15p. 6 refs. Presented at the ASHRAE Semiannual Meeting, N. Y., Feb 11-14, 1963.

IDO-14603 OTS $0.50

Phillips Petroleum Co., Idaho Falls.
THE IN-LINE ANALYSIS OF ELECTROLYTIC DISSOLVER SOLUTIONS FOR NITRIC ACID AND SALT CONCENTRATIONS, by D. P. Pearson. Rept. on Contract AT(10-1)205. Mar 63, 10p. 2 refs.

Civil Engineering

PB 181 127-1 Rev. OTS $2.50

Bureau of Yards and Docks, Washington, D. C. MASONRY FORMULAS. Engineered Performance Standards, Public Works Maintenance. Mar 63, 119p. NAVDOCKS P-708.1, supersedes rept. dated Mar 61, rev. May 61.

DESCRIPTORS: *Civil engineering, *Handbooks, Construction, Concrete, Brick.

Contents:
Lay concrete blocks
Lay common brick
Hand mix concrete
Placing concrete
Finish concrete
Tile setting and repair
Machine mix concrete
Repair of brick, block and concrete surface
Knock out and remove brick or 6" hollow clay block
Lay fire brick
Lay fire brick arch
Drill holes in concrete with a pneumatic hammer
Rotary drilling
Install insulating material
Drill or chip out holes in masonry with hand tools
Saw concrete
Plastering

PB 181 126-1 Rev. OTS $3.00

Bureau of Yards and Docks, Washington, D. C. MASONRY HANDBOOK. Engineered Performance Standards, Public Works Maintenance. May 63, 192p. NAVDOCKS P-708.0, supersedes rept. dated Feb 61, rev June 61.

DESCRIPTORS: *Civil engineering, *Handbooks, Construction, Concrete, Brick.

Contents:
Catch Basin and Manholes - Construct
Concrete - Bulk; Place and Finish
Concrete - Mixing; Hand or Machine
Concrete - Slab Sections
Firebrick - Arch Repair
Firebrick - Boiler Chamber and Ash Pit Wall Repair
Firebrick - Furnace Wall and Floor Repair
Holes Chip - Hammer and Chisel; Concrete, etc.
Holes Chip - Pneumatic Hand Hammer (Chipper); Reinforced Concrete
Holes Drill - Carbide Tipped Core; Concrete, etc. (3/4", 1-1/4")
Holes Drill - Carbide Tipped Core; Concrete Block, etc. (3/4", 1-1/4")
Holes Drill - Carbide Tipped Core; Concrete Block, etc. (3", 4")
Holes Drill - Diamond Core; Reinforced Concrete (2", 4")
Holes Drill - Electric Hand Hammer; Concrete (3/8", 3/4")
Holes Drill - Pneumatic Hammer (60-90 lb.), Reinforced Concrete (1-1/2", 2")
Miscellaneous
Trenches or Patches - Chip Out (Pneumatic Hand Hammer); Concrete
Trenches or Patches - Saw Out; Concrete
Walls - Block Up Openings, Construct
Walls - Knock Out and Remove
Walls and Floors - Repair Cracks, Repoint Joints
Walls and Floors - Repair Leaks and Cracks around Tie Rods
Walls and Floors - Repair Spalls, Replace Blocks and Bricks
Walls and Floors - Repair or Install; Tile
Plastering - Walls and Ceilings ; Repair and Install

PB 181 128-2 Rev. OTS $1.25

Bureau of Yards and Docks, Washington, D. C. ROADS, GROUNDS, PEST CONTROL HANDBOOK. Engineered Performance Standards, Public Works Maintenance. Mar 63, 50p. NAVDOCKS P-712.0, supersedes NAVDOCKS P-712, Sep 60 rev. Jan 61 and Feb 61.

DESCRIPTORS: *Roads, *Naval shore establishments, *Pest control, *Handbooks, Maintenance, Waste (Sanitary engineering), Disposal.

Contents:
Handbook Pest Control, Grounds, Refuse Collection and Disposal, Roads and Paving
Herbicides and Insecticides
Hole; Bore, Dig and Backfill
Lawns; Mow
Lawns; Plant Sprigs, Stolons, and Mulch
Lawns; Rake and Cultivate
Lawns; Shrubs and Hedges, Trim
Lawns; Water and Fertilize
Lawns; Planting Sod
Refuse Collection, Dempster Dumpster & Garbage Can Pick-up and Debris Clearing
Base Material; Excavate, Fill, Grade, Roll and Oil
Bituminous Pavement, Repair
Fence, Cyclone, Install
Rip-Rap Wall, Construct
Stepping Stones, Lay

PB 181 507 OTS $2.25

Bureau of Yards and Docks, Washington, D. C. ROADS, GROUNDS, PEST CONTROL FORMULAS. Engineered Performance Standards, Public Works Maintenance. Mar 63, 86p. NAVDOCKS P-712-1, supersedes rept. dated June 59, rev. 1 Nov 59, 2 Dec 60, and 3 Feb 61.

DESCRIPTORS: *Roads, *Naval shore establishments, *Pest control, *Handbooks, Maintenance, Pavement, Waste (Sanitary engineering), Disposal.

Contents:
Roach Control
Lawn Mowing
Sod Cutting and Laying
Trimming, Lawns, Shrubs and Hedges
Fertilization of Lawns
Vegetative Planting of Buffalo and Bermuda Grass
Hole, Bore and Backfill
Spray, Herbicides and Insecticides
Watering Lawns
Raking and Cultivating
Refuse Collection Dempster Dumpster & Garbage Can
Debris Clearing
Rip-Rap Wall
Repair Bituminous Pavement

Lay Stepping Stones
Excavate, Fill, Grade, Roll, Oil Surface, Operate Pneumatic Hammer and Hand Shovel
Cyclone Fence

Electrical and Electronic Engineering

AD-400 560 repriced $1.25

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBABILITY THEORY AS APPLIED TO RELIABLE NETWORK DESIGN, by James D. LaRue. Final rept., Mar-Sep 62, on Advanced Systems Synthesis and Analysis Methods. Feb 63, 45p. 17 refs. ASD-TDR-62-1072.

DESCRIPTORS: *Electrical networks, Design, *Probability, *Reliability, Statistical analysis, Synthesis.

The probability of success equations for redundant networks are derived from basic component failure statistics. The components have two modes of failure, open or short. The report calculates the equations for four basic redundant networks. A network is then designed based upon these results. The reliability of this network is calculated and compared to several other designs. (Author)

NASA N63-12086 OTS $1.60

Automatic Control Center, Purdue U., Lafayette, Ind.
OPTIMUM AUTOMATIC CONTROL, by Rufus Oldenburger. Rept. on Grant NsG-28-59. [1961] 17p. 5 refs.

PB 181 489 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
A.F. SIGNAL GENERATOR SG-21/U. Technical manual, Navy Calibration Program. 15 Jan 63, 8p. Instrument Calibration Procedure AG-51, supersedes rept. dated 15 Aug 60.

DESCRIPTORS: Audiofrequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is a precision audio frequency signal source which delivers signals of any of 26 fixed frequencies between 10 and 500 cps. The frequencies are generated by a rotating disc-photocell arrangement driven by a tuning fork stabilized oscillator.

PB 181 491 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
CALORIMETRIC POWER METER: HEWLETT PACKARD 434A. Technical manual, Navy Calibration Program. 15 Jan 63, 18p. Instrument Calibration Procedure AP-02.

DESCRIPTORS: *Calorimeters, *Power meters, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Hewlett-Packard 434A calorimetric power meter, which consists primarily of a self-balancing bridge with identical temperature sensitive resistors in two legs, an indicating meter, and two load resistors. It measures power from DC to 12.4 Gc at full-scale indications from 0.01 to 10.0 watts.

PB 181 495 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
DC OR AC (60 CPS) VOLTAGE OR CURRENT INDICATING INSTRUMENTS (USING THACH POWER SUPPLY AND RAH 1605). Technical manual, Navy Calibration Program. 1 Dec 62, 11p. Instrument Calibration Procedure AQ-21.

DESCRIPTORS: Direct current, Alternating current, Electric current, Voltage, *Voltmeters, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of direct and alternating (60 cps) voltage and current indicating instruments. The measurement range of this procedure is limited to the output of the power supply and/or the ranges of the ac-dc transfer standard. The accuracy of the measuremtne system is the accuracy specified for the ac-dc transfer standard.

PB 181 494 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
DC OR AC (60 CPS) VOLTAGE OR CURRENT INDICATING INSTRUMENTS (USING THACH POWER SUPPLY AND STANDARD METER). Technical manual, Navy Calibration Program. 1 Dec 62, 13p. Instrument Calibration Procedure AQ-20.

DESCRIPTORS: Direct current, Alternating current, Electric current, Voltage, *Voltmeters, *Ammeters, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of direct and alternating (60 cps) voltage and current indicating instruments, including volt-ohm-milliammeters. The measurement range of this procedure is limited to the output of the power supply and/or the range (s) of the indicating instrument used as the standard. The accuracy of the measurement system is the accuracy specified for the indicating instrument used as the standard.

PB 181 497 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
ELECTRON TUBE TEST SET AN/USM-31. Technical manual, Navy Calibration Program. 15 Nov 62, 21p. Instrument Calibration Procedure AY-06.

DESCRIPTORS: *Electron tubes, *Test sets, Calibration, Instrumentation, Instruction manuals, Test equipment (Electronics).

This procedure describes the calibration of the AN/USM-31 Electron Tube Test Set, designed to measure the electrical characteristics of electron tubes under simulated operating conditions. The test instrument consists primarily of a well-filtered, accurately-metered, adjustable power supply of a-c and d-c potentials, and a specially compensated and calibrated transconductance meter.

PB 181 496 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. ELECTRON TUBE TESTER: HICKOK 539A. Technical manual, Navy Calibration Program. 15 Jan 63, 14p. Instrument Calibration Procedure AY-01, supersedes rept. dated 4 Feb 59.

DESCRIPTORS: *Electron tubes, *Test equipment (Electronics), Calibration, Instrumentation, Instruction manuals.

The Test Instrument consists primarily of a line voltage meter, grid bias meter, micromhos meter, circuit selector switches, and integral power supplies.

PB 181 488 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. ELECTRONIC VOLTMETER: BALLANTINE LABORATORIES 310A. Technical manual, Navy Calibration Program. 1 Dec 62, 20p. Instrument Calibration Procedure AE-28.

DESCRIPTORS: Electronic equipment, *Voltmeters, Calibration, Instrumentation, Instruction manuals, Measuring devices (Electrical and Electronic).

This procedure describes the calibration of the Ballantine 310A electronic voltmeter, which measures full-scale voltages from 0.001 to 100 volts at frequencies from 10 cps to 2 Mc.

PB 163 164 OTS $21.00

Radio Corp. of America, Moorestown, N. J. INSTRUMENTATION RADAR AN/FPS-16(XN-1): EVALUATION AND ANALYSIS OF RADAR PERFORMANCE, by D. K. Barton. Final rept. on Contracts DA 36-034-ORD-151 and NOas-57-163d. [1960] 363p. 16 refs.

DESCRIPTORS: *Radar equipment, Tests, Analysis, Aircraft, Radar beacons, *Tracking, Radar tracking, *Guided missile tracking systems, Guided missile ranges, Instrumentation.

The first Instrumentation Radar was delivered to Patrick AFB during 1957 for use by the Naval Research Laboratory in the Vanguard satellite program. The radar had been developed between July 1953 and June 1956 to prove the feasibility of a tracking radar for accurate guided missile range instrumentation, and to provide a design for subsequent production models of such a radar. Aircraft tracking tests run by the NRL during 1955 and 1956 established success in meeting the specification, which called for a 0.1 mil rms tracking error and an overall data accuracy within 0.2 mil rms. This report summarizes the results of the NRL tests, and presents the results of further tests run by RCA to determine the limiting accuracy and precision of tracking on such targets as missiles and beacon-equipped vehicles, under guided missile test range conditions.

PB 181 493 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. OUTPUT METER TS-585A/U, TS-585B/U, TS-585C/U, OR TS-585D/U. Technical manual, Navy Calibration Program. 1 Dec 62, 12p. Instrument Calibration Procedure AP-04.

DESCRIPTORS: *Measuring devices (Electrical and Electronic), Calibration, Instrumentation, Instruction manuals, Electrical impedance, Measurement.

This procedure describes the calibration of the TS-585A/U, TS-585B/U, TS-585C/U, or TS-585D/U output meter, which is a portable test set designed to measure the amplitude and characteristic impedance of audio amplifiers, filters, oscillators and similar equipment.

PB 181 492 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. RF WATTMETERS, SINGLE-ENDED: 0 TO 50 WATTS. Technical manual, Navy Calibration Program. 1 Dec 62, 13p. Instrument Calibration Procedure AP-03.

DESCRIPTORS: Radiofrequency, *Wattmeters, Calibration, Instrumentation, Instruction manuals, Power meters.

This procedure describes the calibration of a general class of single-ended, absorption type wattmeters primarily designed to measure RF power from any source within their ranges.

PB 181 490 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. SIGNAL GENERATOR SG-21A/U OR SG-21B/U. Technical manual, Navy Calibration Program. 15 Jan 63, 9p. Instrument Calibration Procedure AG-66.

DESCRIPTORS: *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the SG-21A/U or SG-21B/U signal generator, which is used to align and calibrate the Frequency Meter and Radiosonde Recorder of Radiosonde Receptor AN/FMQ-2.

PB 181 499 OTS $0.50

Bureau of Naval Weapons, Washington, D. C. STANDING WAVE INDICATOR IM-89/UR. Technical manual, Navy Calibration Program. 15 Oct 62, 10p. Instrument Calibration Procedure GV-06.

DESCRIPTORS: *Standing-wave indicators, Calibration, Instruction manuals, Test equipment (Electronics),

This procedure describes the calibration of the IM-89/UR Standing Wave Indicator, which is basically a double-ended power measuring device designed to measure VSWR from 1.0 to 6.0 or reflected power from 0 to 50%. It consists of a primary coaxial line (51.5Ω nominal), a d-c microammeter, and a bi-directional coupling structure. The coupling device includes a crystal rectifier and associated R-C networks designed to detect the RF input power in the forward direction. The resultant d-c component is applied to

the d-c microammeter, whose scale is calibrated to indicate the percent of reflected power or VSWR when the coupler is switched to the reverse position. (Author)

PB 181 498 OTS $0.50

Bureau of Naval Weapons, Washington, D. C.
TRANSISTOR TEST SET TS-1294A/U. Technical manual, Navy Calibration Program. 15 Jan 63, 17p. Instrument Calibration Procedure AY-12.

DESCRIPTORS: *Transistors, *Test sets, Calibration, Instrumentation, Instruction manuals, Test equipment (Electronics).

This procedure describes the calibration of the TS-1294A/U Transistor Test Set, which is designed to measure the following characteristics of semiconductors: (1) the dc Beta of transistors, which is defined as the ratio of the change of dc collector current to dc base current, when connected in the common emitter configuration; (2) the h_{fe} of transistors, which is defined as the ratio of the change of ac collector current to ac base current, when connected in the common emitter configuration; and (3) the leakage of diodes and transistors.

NASA N63-12964 OTS $10.50

Case Inst. of Tech., Cleveland, Ohio.
THE ANALYSIS OF A VORTEX TYPE MAGNETOHYDRODYNAMIC INDUCTION GENERATOR, by L. L. Lengyel. Technical rept. A-10 on Grant NsG-198-62. Oct 62, 137p. 24 refs.

NASA N63-13961 OTS $2.60

Electro-Optical Systems, Inc., Pasadena, Calif.
FEASIBILITY STUDY TOWARD DEVELOPMENT OF RADIATION RESISTANT SOLAR CELL, by S. Kaye. Interim engineering rept. 1 Nov 61-30 June 62, on Contract NAS7-92. 31 July 62, 22p. EOS rept. 2080-IR-1.

NASA N63-12611 OTS $7.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
VENUS RADAR SYSTEMS INVESTIGATIONS, by J. F. Reintjes, R. M. Cornew and others. Semiannual status rept. 1 Apr-30 Sep 62, on Grant NsG-234-61. Nov 62, 71p. 13 refs. Rept. ESL-SR-157.

AD-400 559 repriced $3.00

Hoffman Electronics Corp., El Monte, Calif.
SOLAR ENERGY MEASUREMENT TECHNIQUES, by Bernd Ross and D. B. Bickler. Final rept. Mar 61-31 Aug 62, on Study and Applied Research on Measurement Techniques for Solar Energy Converters, Contract AF 33(616)7946. Jan 63, 165p. 56 refs. ASD-TDR-62-882; NASA N63-16269.

DESCRIPTORS: *Solar cells, *Solar radiation, *Power supplies, Test equipment, Manufacturing methods, Tungsten, Light, Sun, Silicon, Pyrheliometers, Test methods, Stability, Xenon, Spectrum analyzers, Calibration, Instrumentation, Measurement.

A broad investigation has been made of the subject of solar cell measurements. A portable tester has been designed and built which will enable an operator to determine the output of a solar cell power supply in space by analyzing output under conditions existing at either laboratory or field test sites. Painstaking experimentation and analysis of many alternatives has resulted in recommended optimum instrumentation and procedures for measuring solar cells and for performing the calibrations required. Calibrated primary standard solar cells have been provided in terms of their absolute spectral response. Data has been accumulated on the operational parameters of many solar cells using optimized measurement procedures. (Author) (See also AD-281 829)

NASA N63-14450 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOLAR-CELL POWER SYSTEMS TESTING, by John A. Zoutendyk. Rept. on Contract NAS7-100. 17 Dec 62, 23p. 7 refs. JPL TR-32-350.

NASA N63-14340 OTS $5.60

Minneapolis-Honeywell Regulator Co., Minn.
ADAPTIVE STATE VECTOR CONTROL. SECTION 7: APPROXIMATIONS TO STATE VECTOR CONTROL, by J. A. Lovingood. Rept. on Contract NASr-27. 31 May 62, 53p. 11 refs. MH MPG rept. 1529-TR7.

NASA N63-11585 OTS $2.60

Oklahoma State U. Research Foundation, Stillwater.
DEVELOPMENT OF TRANSISTORIZED MINIATURE 15-CHANNEL PULSE-TIME TELEMETRY MODULATOR AND FIELD SERVICE ACTIVITY. VOLUME I, by Oscar L. Cooper. Final rept. on Contract NASr-4. 1 Oct 62, 27p.

NASA N63-11586 OTS $5.60

Oklahoma State U. Research Foundation, Stillwater.
DEVELOPMENT OF TRANSISTORIZED MINIATURE 15-CHANNEL PULSE-TIME TELEMETRY MODULATOR AND FIELD SERVICE ACTIVITY. VOLUME II. APPENDIX. A MINIATURIZED FIFTEEN-CHANNEL TELEMETRY MODULATOR, by Oscar L. Cooper. Final rept. on Contract NASr-4. 1 Oct 62, 52p.

IDO-16809 OTS $0.50

Phillips Petroleum Co., Idaho Falls.
A TRANSFER FUNCTION FOR D. C. OPERATIONAL AMPLIFIERS WITH GENERALIZED EXTERNAL NETWORKS, by S. R. Gossmann. Rept. on Contract AT(10-1)205. 25 Feb 63, 16p. NASA N63-15886.

PB 163 105 OTS $5.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
A FREQUENCY-DOMAIN THEORY OF PARAMETRIC AMPLIFICATION, by Benjamin J. Leon (Doctoral thesis). Rept. on Contracts DA 36-039-sc-78108 and AF 19(604)5200. 5 June 59, 57p. 25 refs. Technical rept. 354; AD-235 437.

DESCRIPTORS: *Microwave amplifiers, Theory, *Electrical networks, *Electronic circuits, Difference equations, Series, Mathematical analysis, *Parametric amplifiers.

A general method is presented of analysis of circuits containing a few decoupled periodic elements in a network of lumped, linear, finite, passive, bilateral, time-invariant elements. For these circuits it is shown that the characteristic frequency-domain equations that define the voltages and currents as functions of the complex frequency are linear difference equations with variable coefficients. A sinusoidally varying capacitance in an arbitrary passive network with steady-state signal excitation is discussed. By using the calculus of finite differences to find exact solutions to the difference equations it was possible to prove three fundamental statements concerning parametric amplifier performance: (a) The gain is independent of the phase of the signal relative to the varying parameter except in a degenerate case that can easily be avoided. (b) The passive circuit admittance at idler frequency, the difference between the signal frequency and the frequency of the parameter, is important. (c) Because of the interaction of the signal and the varying element, high-frequency voltages are produced; but the voltage amplitudes go to zero exponentially as frequency increases, if the varying parameter is positive for all time.

Ordnance, Missiles, and Satellite Vehicles

NASA N63-14546 OTS $5.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS, No. C-31, by Beatrice Miller. Rept. on Grant NsG-87-60. 28 Jan 63, 57p. SAO special rept. 114.

NASA N63-14411 OTS $7.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS, NO. C-33, by Beatrice Miller. Rept. on Grant NsG-37-60. 30 Jan 63, 73p. SAO Special rept. 116.

NASA N63-13072 OTS $3.60

Hughes Research Labs., Malibu, Calif.
A FEASIBILITY STUDY OF SATELLITE COMMUNICATION IN THE 15-20 Gc FREQUENCY RANGE, by S. G. Lutz and S. C. Plotkin. Rept. no. 4 on NASA Contract NASw-495. Jan 63, 38p. 14 refs.

NASA N63-10958 OTS $23.50

IBM Federal systems Div., Rockville, Md.
NASA PROJECT MERCURY. BERMUDA MONITOR PROGRAMS. Rept. on Contract NAS5-1376. Rev. 1 May 62, 447p. MC 104.

NASA N63-10960 OTS $11.50

IBM Federal Systems Div., Rockville, Md.
NASA PROJECT MERCURY. POSTFLIGHT REPORTER PROGRAM. Rept. on Contract NAS5-1376. Rev. 1 May 62, 157p. MC110.

NASA N63-10957 OTS $9.10

IBM Federal Systems Div., Rockville, Md.
NASA PROJECT MERCURY. PROGRAM SYSTEM STANDARDS. Rept. on Contract NAS5-1376. Rev. 1 May 62, 104p. MC 102.

NASA N63-14466 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER (VENUS '62) FLIGHT TELECOMMUNICATION SYSTEM, by J. N. Bryden. Rept. on Contract NAS7-100. 15 Jan 63, 24p. 8 refs. JPL TR-32-377.

NASA N63-15281 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE PERTURBATIONS OF A HYPERBOLIC ORBIT BY AN OBLATE PLANET, by Carl G. Sauer., Jr. Rept. on Contract NAS7-100. 15 Jan 63, 12p. 8 refs. Technical rept. no. 32-131.

NASA N63-15244 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RANGER PREFLIGHT SCIENCE ANALYSIS AND THE LUNAR PHOTOMETRIC MODEL, by A. G. Herriman, H. W. Washburn, and D. E. Willingham. Rept. on Contract NAS7-100. 7 Jan 63, Rev. 11 Mar 63, 40p. 11 refs. N63-13449, rev. UPL-TR-32-384, rev.

NASA N63-14591 OTS $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-20, VOLUME III FOR THE PERIOD JANUARY 1-FEBRUARY 28, 1963. DEEP SPACE INSTRUMENTATION FACILITY. Rept. on Contract NAS7-100. 31 Mar 63, 72p. 8 refs. JPL-SPS-37-20, v. III.

NASA N63-15243 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STERILIZATION OF UNMANNED PLANETARY AND LUNAR SPACE VEHICLES - AN ENGINEERING EXAMINATION, by L. D. Jaffe. Rept. on Contract NAS7-100, 7 Jan 63, Rev. 25 Mar 63, 23p. 40 refs. JPL TR-32-325, rev.; NASA N63-13440;

NASA N63-13623 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRACKING TECHNIQUES FOR INTERPLANETARY SPACECRAFT, by R. P. Mathison. Rept. on Contract NAS7-100. 1 Aug 62, 25p. 11 refs. Technical rept. no. 32-284; NASA N62-17988.

NASA N63-10782 OTS $18.50

Martin-Marietta Corp., Baltimore, Md.
CREW PERFORMANCE DURING SIMULATED LUNAR MISSIONS, by Milton A. Grodsky and John P. Bryant. Final rept. on Contract NAS1-1861. Aug 62, 297p. 39 refs. ER 12693.

NASA N62-16428 OTS $1.60

National Aeronautics and Space Administration, Washington, D. C.
RELIABILITY ESTIMATION FOR SPACE SYSTEMS, by William Wolman. 14 Sep 61, 20p. 10 refs.

NASA N63-12365 OTS $1.10

National Aeronautics and Space Administration, Washington, D. C.
CHRONOLOGY OF MAJOR NASA LAUNCHINGS, OCTOBER 1, 1958 THROUGH SEPTEMBER 30, 1962, by Robert Rosholt. Oct 62, 10p. 2 refs. NASA Historical rept. no. 8.

NASA N63-12355 OTS $3.60

Northrop Space Labs., Hawthorne, Calif.
A VARIABLE GEOMETRY SPACE STRUCTURES CONCEPT. BASIC CHARACTERISTICS AND CAPABILITIES, by W. R. Hilker and R. S. Fujioka. Rept. on Contract NASr-114. Oct 62, 40p. NSL 62-228.

NASA N63-11051 OTS $4.60

Rand Corp., Santa Monica, Calif.
ON THE DYNAMICAL EFFECTS OF FUEL FLOW ON THE MOTION OF BOOST VEHICLES, by Dominic G. B. Edelen. Rept. on Contract NASr-21(03). Oct 62, 47p. 9 refs. Memo. RM-3288-NASA.

NASA N63-15032 OTS $21.00

Space Technology Labs., Inc., Redondo Beach, Calif.
ADVANCED VALVE TECHNOLOGY FOR SPACECRAFT ENGINES, by B. P. Brady and R. J. Salvinski. Final rept. 25 Feb 62-25 Jan 63, on Contract NAS7-107. Mar 63, 360p. 131 refs. Rept. no. 8651-6016-RU-000.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NASA N63-12339 OTS $1.60

Catholic U. of America, Washington, D. C.
THE DYNAMICS OF SOLID PROPELLANT ROCKET MOTORS, by J. H. Baltrukonis. Summary rept. on Grant NsG-125-61. 12 Dec 62, 12p.

NASA N63-14483 OTS $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEVELOPMENT OF A HEATED-HYBRID GENERATED GAS PRESSURIZATION SYSTEM FOR PROPELLANT TANKS, by Donald H. Lee and David D. Evans. Rept. on Contract NAS7-100. 15 Feb 63, 56p. 16 refs. JPL-TR-32-375.

NASA N63-14413 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A NUCLEAR REACTOR CONCEPT FOR ELECTRIC PROPULSION APPLICATION, by Jerry P. Davis. Rept. on Contract NAS7-100. 4 Mar 63, 37p. 2 refs. JPL-TR-32-385.

NASA N63-13081 OTS $8.10

Stanford Research Inst., Menlo Park, Calif.
A SURVEY AND EVALUATION OF HIGH ENERGY LIQUID CHEMICAL PROPULSION SYSTEMS. PART I: PROPELLANT SELECTION CRITERIA FOR SPACE MISSIONS, by James A. Mac Leod and P. Roger Gillette. Final rept. on NASA Contract NASr-38, 15 Mar 61 to 14 Oct 62. 1 Nov 62, 85p. 23 refs. SRI Proj. PRU-3652.

NASA N63-13082 OTS $6.60

Stanford Research Inst., Menlo Park, Calif.
A SURVEY AND EVALUATION OF HIGH ENERGY LIQUID CHEMICAL PROPULSION SYSTEMS. PART II: PREPARATION AND PROPERTIES OF OZONE FLUORIDE, by Adolph B. Amster, Joseph A. Neff, and others. Final rept., 15 Mar 61-15 Oct 62, on NASA Contract NASr-38. 1 Nov 62, 64p. 39 refs. SRI Proj. PRU-3652.

MATERIALS

PB 163 168 OTS $3.60

Burke Research Co. [Warren] Mich.
RESEARCH AND DEVELOPMENT OF HI-TEMPERATURE NUCLEAR RADIATION RESISTANT ELASTOMERS, by Pauls Davis, Urs F. Nager and others. Quarterly progress rept. no. 1, 1 July-30 Sep 57, on Contract AF 33(616)5303. 8 Oct 57, 35p. 13 refs; AD-159 494; NP-6464.

DESCRIPTORS: *Heat-resistant plastics, Reactor materials, *Radiation damage, Inhibition, *Elastomers, *Polyethylene plastics, *Styrene plastics, *Butadienes, *Isoprene, Polymerization, *Catalysts, *Ziegler catalysts, *Friedel-Crafts reactions, Sodium compounds, Titanium compounds, Lithium compounds, Pentenes, Alkyl radicals, Chlorides

Various contact catalysts were employed in preparation of polymer samples, and the methods of preparation are described. The types of catalyst were chiefly combinations of organo alkali metal compounds and Group IV metal chlorides with and without additional modifying additives. Sixty polymers are reported. Several were liquid polymers which will not be further studied. (Author)

NASA N63-13263 OTS $2.60

Hughes Aircraft Co., Culver City, Calif.
DEVELOPMENT OF REFRACTORY FABRICS, by L. E. Gates and W. E. Lent. Quarterly rept. no. 6, 3 June-2 Sep 62, on Contract NAS8-50. 15 Sep 62. 28p. 4 refs.

NASA N63-11697 OTS $1.60

Pratt and Whitney Aircraft, East Hartford, Conn.
DETERMINATION OF THE EMISSIVITY OF MATERIALS, by W. H. Askwyth. Progress rept. 1 Jan-30 June 62, on Contract NASw-104. [1962] 19p. PWA-2088.

NASA N62-14421 OTS $1.10

Southwest Research Inst., San Antonio, Tex.
LIQUID DYNAMICS IN MISSILE FUEL TANKS. Published papers and Technical rept. 1957-May 61, on Contracts DA 23-072-ORD-1062, DA 23-072-ORD-1251, and NASw-146. 23 June 61, 4p. 20 refs.

NASA N63-12342 OTS $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF THE RELATIONSHIP OF PROPERTIES OF COMPOSITE MATERIALS TO PROPERTIES OF THEIR CONSTITUENTS, by Norris F. Dow and B. Walter Rosen. Quarterly progress rept. no. 1 on Contract NASw-470. 30 Nov 62, 46p. 6 refs.

Plastics

AD-401 871 repriced $1.25

Massachusetts Inst. of Tech., Cambridge.
ORGANOMETALLIC POLYMERS, by D. Seyferth. Final rept. 1 Oct 58-31 May 61, on Contract DA 19-129-qm-1277. 1 Aug 61, 48p.

DESCRIPTORS: *Organic compounds, *Aromatic compounds, Metalorganic compounds, Silanes, Germanium compounds, Tin compounds, Fluorides, Nuclear magnetic resonance, Chromatographic analysis, Spectra (Infrared), Synthesis (Chemistry), Phosphines, *Gas chromatography.

PB 163 130 OTS $4.60

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF HIGH TEMPERATURE RESISTANT TRANSPARENT PLASTICS, by Howard W. Christie. Quarterly progress rept. no. 1, 15 Apr-14 July 59, on Contract NOas 59-6137-c. 25 Nov 59, 46p. 8 refs. AD-232 342.

DESCRIPTORS: *Plastics, High-temperature research, *Heat-resistant plastics, Alkoxy radicals, Organoboranes, *Epoxy resins, Stability, *Thermosetting resins, Discoloration, Colors, *Aircraft canopies, Oxidation, Handling, Ethers, Phenols, Cyclohexenes, Cyclohexanes, Anhydrides.

The resin produced by the reaction of hexahydrophthalic anhydride and the diglycidyl ether of bisphenol A has excellent initial freedom from color. This mixture can be cured at moderate temperatures by using a quaternary amine catalyst. Rather severe discoloration takes place within 2 hr. of exposure to 400° F making this combination unsuitable for use in composite high speed aircraft canopies. Saturated epoxy resins containing no phenolic nuclei show considerable promise. These materials in conjunction with hexahydrophthalic anhydride can be cured in reasonable times at 180°F to produce resins with much better thermal stability than the bisphenol A type. Resins of this kind have not produced completely colorless cured castings. Boric oxide is proposed as a catalyst for the etherification reaction of epoxy resins. Trimethoxyboroxine provides a method for solution of boric oxide in the resins. Cured castings of trimethoxyboroxine catalyzed diglycidyl ether of bisphenol A have excellent freedom from color and better resistance to discoloration at 350°F. (Author)

MATHEMATICS

NASA N63-14467 OTS $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE ALGEBRA OF PERIODIC SEQUENCES, by R. C. Titsworth. 7 Jan 63, 53p. 12 refs. Rept. on Contract NAS7-100. JPL TR-32-381.

NASA N63-15317 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NUMERICAL MATRIX INVERSION WITH ITERATIVE IMPROVEMENT, by Cleve Moler. Rept. on Contract NAS7-100. 15 Mar 63, 15p. 6 refs. Technical rept. no. 32-394.

LA-2414 OTS $1.50

Los Alamos Scientific Lab., N. Mex.
THE BOUNDING OF INSTABILITIES OF THE PIC DIFFERENCE EQUATIONS, by Bart J. Daly. Rept. on Contract W7405-eng-36. Dec 62, 63p. 4 refs. NASA N63-14711.

NASA N63-12152 OTS $1.60

RIAS, Inc., Baltimore, Md.
A FUNDAMENTAL INEQUALITY FOR FINITE DIFFERENCE EQUATIONS, by G. Stephen Jones. Rept. on Contracts NASr-103, AF 49(638)382, and Nonr-3693(00). [1962] 13p.

NASA N63-12655 OTS $7.60

RIAS, Inc., Baltimore, Md.
MATHEMATICAL DESCRIPTION OF LINEAR DYNAMICAL SYSTEMS, by R. E. Kalman. Rept. on Contracts NASr-103, AF 49(638)382, and AF 33(616)6952. 76p. 26 refs. Technical rept. 62-18.

SCR-483 OTS $4.00

Sandia Corp., Albuquerque, N. Mex.
TABLES OF THE DISTRIBUTION OF THE COEFFICIENT OF COHERENCE FOR STATIONARY BIVARIATE GAUSSIAN PROCESSES, by D. E. Amos and L. H. Koopmans. Rept. on Contract AT(29-1)789. Mar 63, 328p. 25 refs. NASA N63-15464.

SCR-501 OTS $3.00

Sandia Corp., Albuquerque, N. Mex.
TABLES OF ROOTS OF THE FIRST TEN THOUSAND INTEGERS, by C. B. Bailey and G. E. Reis. Rept. on Contract AT(29-1)789. Jan 63, 237p. 2 refs. NASA N63-14898.

Y-1400 OTS $2.00

Union Carbide Nuclear Co., Oak Ridge, Tenn.
CUBIC SPLINE, A CURVE FITTING ROUTINE, by A. H. Fowler and C. W. Wilson. Rept. on Contract W7405-eng-26. 5 Sep 62, 86p. 3 refs. NASA N63-14977

Computing Devices

AD-401 644 repriced OTS $1.50

Eclipse Pioneer Div., Bendix Corp., Teterboro, N. J.
HIGH DENSITY OPTICAL MEMORY DRUM, by W. W. Lee. Final rept., Feb 61-May 62, on Optical Memory Development, Contract AF 33(616)7995. Feb 63, 55p. ASD-TDR-62-791.

DESCRIPTORS: *Computer storage devices, *Data storage systems, Optical coatings, Photographic images, Fiber optics, Density, Digital computers, Microminiaturization (Electronics), Design, Optical equipment components, Manufacturing methods.

The techniques of manufacture of high-density permanent storage devices for digital computers using optical techniques are discussed. The application of these techniques is shown in a feasibility model delivered to the Air Force under the subject contract. This memory has a storage capacity of over a million bits and occupies approximately 1/8 cu. ft. The experimental results are given and future plans are outlined. (Author)

HW-71044 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
CIRCUITS FOR MANUAL ENTRY OF DATA INTO A MULTICHANNEL ANALYZER MEMORY, by G. E. Driver. Rept. on Contract AT(45-1)1350. 13 Sep 61, 18p. NASA N63-15674.

AD-272 832 OTS $5.60

Martin-Marietta Corp., Baltimore, Md.
STATUS OF MICROWAVE MEMORY TECHNIQUES PROJECT, by R. J. Allen, A. J. Cummings, and F. M. Kudo. Technical note on Contract AF 30(602)2414. 31 Dec 61, 57p. 11 refs. Rept. no. ER 11741-4; RADC-TDR-62-65.

DESCRIPTORS: *Cryogenics, *Microwave equipment, *Data storage systems, Memory devices, *Coaxial cables, Transmission lines, *Delay lines, Superhigh frequency, Ultra high frequency, Superconductors, Low temperature research, Tests, Measurement, Microwaves, Superconductivity, Attenuation, Electromagnetic wave reflections, Cryostats, Helium, Liquefied gases, Broadband, Electric connectors, Lead, Encapsulation.

The objectives of this program are to study techniques for microwave storage, utilizing cryogenics and, based on the first 8 months of this study, to design and fabricate a storage device capable of 20 microsecond delay with a bandwidth of 4 to 12 kmc and attenuation of 2 db. Both pulse and insertion loss measurements show the coaxial transmission line to be virtually lossless up to about 1 kmc. Losses encountered above 1 kmc are not proportional to length, nor do they indicate conclusively any of the suspected loss mechanisms. Additional testing is required. Encapsulation of lines in lead has proven successful. Lines have also been operated successfully in the vacuum space exterior to the helium chamber. Coaxial connectors have been improved considerably, although they are still not completely satisfactory. Tapered transitions under development show considerable promise. Marked success has been obtained in design of broad-band coaxial to strip line transitions, the VSWR being under 1:30:1 over 4 to 12 kmc. Work is in progress on the constant impedance transition from large to small strip lines. (Author)

ORNL-3399 OTS $0.75

Oak Ridge National Lab., Tenn.
AN ALGOL 60 SYNTAX CHECKER FOR THE IBM 7090 COMPUTER, by M. P. Lietzke. Rept. on Contract W7405-eng-26. 1960. 26p. 1 ref. NASA N63-13975.

MECHANICS

ANL-6625 OTS $1.75

Argonne National Lab., Ill.
LOCAL PARAMETERS IN COCURRENT MERCURY-NITROGEN FLOW, by L. G. Neal (Northwestern U.) Rept. on Contract W31-109-eng-38. Jan 63, 74p. 47 refs. NASA N63-14562.

ANL-6667 OTS $0.50

Argonne National Lab., Ill.
A STUDY OF THE FLOW OF SATURATED FREON-11 THROUGH APERTURES AND SHORT TUBES, by Hans K. Fauske and Tony C. Min. Rept. on Contract W31-109-eng-38. Jan 63, 19p. 12 refs. NASA N63-15218.

AD-402 126 repriced $0.75

Columbia U., New York.
SOME PROBLEMS IN PHENOMENOLOGICAL FRACTURE MECHANICS, by A. M. Freudenthal and M. P. Bieniek. Final rept., Mar 61-Mar 62, on Metallic Materials, Contract AF 33(616)6112. Mar 63, 25p. 7 refs. ASD-TDR-63-221; NASA N63-15325

DESCRIPTORS: *Continuum mechanics, *Fracture (Mechanics), Mathematical analysis, Mechanical properties, Stresses, Elasticity, Plasticity, Brittleness, Deformation, Theory, Solids.

Certain problems of propagation of microcracks (Griffith cracks) and fracture cracks are considered. The phenomenological approach based on the concept of the continuum and the methods of mechanics of solids is used. An energy criterion for equilibrium of cracks in inelastic solids is formulated in the form which reduces to Griffith's criterion in the case of brittle solids and, with certain simplifying assumptions, results in Orowan's criterion for elastic-plastic solids. Another criterion is derived from the analysis of the stresses at the edge of a crack. This stress criterion is also extended over time-dependent crack resistance by relating it to certain characteristics of the inelastic deformation. (Author)

NASA N63-12366 OTS $6.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
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DESCRIPTORS: *Energy conversion, *Nuclear energy, Photoelectric cells (Semiconductors), Radioactive isotopes, Beta particles, Absorption, Luminescence, Phosphorescent materials, Electric potential, Radiation effects, Temperature, Silicon, Zinc compounds, Photons

A double energy conversion technique was studied for aerospace use as a radioisotope powered 10 watt electrical output power source. In this technique, beta particles from a radioisotope are absorbed by a luminescent material which emits a multiplicity of low energy photons. These photons are then converted to electrical energy by a photovoltaic device. The three components (radioisotope, phosphor, and photovoltaic cell) are discussed individually and then in combination in various geometries of source-phosphor and phosphor-photovoltaic converter. Nuclear radiation effects on the phosphor and photovoltaic materials restrict the choice of the radioisotope to a low energy beta emitter; and temperature effects limit the number of unit power cells

which may be stacked in one bundle. These effects are more pronounced in silicon photovoltaic converters than in ZnCdS: Cu type phosphors. A ten watt output power source fabricated with currently available materials (Pm-147, ZnCdS: Cu, and silicon photovoltaic cells) would have an overall energy conversion efficiency of about 0.2 percent and a power per weight ratio of 4 mw/lb. It is estimated that the power per weight could be increased by a factor of ten to forty if certain ideal materials were available. The rapid decrease in photovoltage and energy conversion efficiency of silicon cells at low illumination intensities causes an appreciable loss in the overall efficiency of such power source. (Author)

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NAA-SR-7797 OTS $1.25

Atomics International, Canoga Park, Calif.
SNAP AEROSPACE SAFETY PROGRAM. Quarterly technical progress rept., July-Sep 62, on Contract AT(11-1)GEN-8. 20 Mar 63, 55p. NASA N63-14724.

NAA-SR-8097 OTS $1.00

Atomics International, Canoga Park, Calif.
SNAP AEROSPACE SAFETY PROGRAM. Quarterly technical progress rept., Oct-Dec 62, on Contract AT(11-1)GEN-8. 1 Apr 63, 38p.

NAA-SR-7925 OTS $1.50

Atomics International, Canoga Park, Calif.
SRE THIRD CORE HEAT TRANSFER ANALYSIS, by J. S. McDonald. Interim rept. on Contract AT(11-1)GEN-8. 1 Apr 63, 65p. 23 refs.

BAW-1266 $2.25

Babcock and Wilcox Co., Lynchburg, Va.
SPECTRAL SHIFT CONTROL REACTOR BASIC PHYSICS PROGRAM. Quarterly technical rept. no. 9, Oct-Dec 62, on Contract AT(30-1)2602. 104p. 20 refs. NASA N63-15823.

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BMI-1623 $1.25

Battelle Memorial Inst., Columbus, Ohio.
RELEASE OF FISSION GASES FROM UO_2 DURING AND AFTER IRRADIATION, by James B. Melehan, Russell H. Barnes and others. Rept. on Contract W7405-eng-92. 26 Mar 63, 52p. 11 refs. NASA N63-15531.

BNL-788 OTS $0.75

Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW, ed. by O. E. Dwyer. A bimonthly technical progress review. Volume 1, no. 1. Feb 63, 31p. BNL-PR-1.

BNL-759(S-62) OTS $2.00

Brookhaven National Lab., Upton, N. Y.
NUCLEAR ENGINEERING DEPARTMENT, ed. by Jean H. Reynolds. Progress rept., 1 May-31 Aug 62. Jan 63, 89p. BNL S-62; NASA N63-14890.

BNL-756 OTS $5.00

Brookhaven National Lab., Upton, N. Y.
PROCEEDINGS OF 1962 HIGH-TEMPERATURE LIQUID-METAL HEAT TRANSFER TECHNOLOGY MEETING AT BROOKHAVEN NATIONAL LABORATORY, MAY 17-18, 1962. Rept. on [Contract AT(30-2) GEN-16]. 404p. C-35; NASA N63-15001; includes NASA N63-(15002-15024).

BNL-774 OTS $0.50

Brookhaven National Lab., Upton, N. Y.
A REVIEW OF NONLINEAR REACTOR DYNAMICS PROBLEMS, by Jack Chernick. July 62, 10p. 30 refs. [Contract AT(30-2)GEN-16].

GEMP-186 OTS $0.75

General Electric Co., Cincinnati, Ohio.
PROBLEMS ASSOCIATED WITH HIGH-TEMPERATURE FASTENERS, by J. C. Blake, H. J. Kurtz, and R. L. Sundin. Rept. on Contract AT(40-1)2847. 15 Apr 63, 27p. 2 refs. NASA N63-15934.

GEMP-76 OTS $1.25

General Electric Co., Cincinnati, Ohio.
REACTOR INSTRUMENTATION AND CONTROL PROGRESS REPORT NO. 76, on Contract AT(40-1)2847 29 Apr 63, 47p.

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EVALUATION OF ZIRCONIUM 1.5 W/O NIOBIUM CLADDING FOR USE IN BOILING WATER REACTOR ENVIRONMENTS, by W. C. Rous and C. J. Baroch. Rept. on Contract AT(04-3)189. Oct 62, 23p. 5 refs.

GEAP-3914 OTS $2.50

General Electric Co., San Jose, Calif.
IN-CORE POWER MONITORING OF NUCLEAR REACTORS, by R. A. DuBridge. Rept. on Contract AT(04-3)189. 15 Apr 62, 129p. 29 refs. NASA N63-14206.

HW-74304 OTS $2.50

Hanford Atomic Products Operation, Richland, Wash.
CALCULATED COSTS OF FABRICATION OF PLUTONIUM-ENRICHED FUEL ELEMENTS, by H. E. Hanthorn. Rept. on Contract AT(45-1)1350. Aug 62, 130p. 10 refs.

HW-76646 OTS $0.75

Hanford Atomic Products Operation, Richland, Wash.
PRTR MECHANICAL SEAL PUMP OPERATING EXPERIENCE, by P. A. Scott. Rept. for Aug 60-Nov 62, on Contract AT(45-1)1350. Mar 63, 30p. 1 ref. NASA N63-15675.

NASA N63-10643 OTS $4.60

Heat Transfer and Fluid Mechanics Lab., U. of Michigan, Ann Arbor.
VOID FRACTION MEASUREMENTS IN A CAVITATING VENTURI, by Willy Smith, Gerald L. Atkinson, and Frederick G. Hammitt. Internal rept. 17 on Grant NsG-39-60. Oct 62, 46p. 12 refs. Based on ORS rept. 03424-7-T.

NASA N63-10652 OTS $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ANALYSIS OF THE THERMAL DESIGN LIMITATIONS OF SOLID-CORE REACTORS FOR NUCLEAR PROPULSION, by D. R. Bartz. Rept. on Contract NAS7-100. 15 Nov 62, 45p. 16 refs. Technical rept. no. 32-217.

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FLT, AN IBM-704 DIGITAL COMPUTER PROGRAM FOR THE CALCULATION OF MULTI-LOOP FLOW TRANSIENTS, by G. H. Borrmann, R. D. Burgess and others. Rept. on Contract W31-109-eng-52. Apr 61, 130p. 9 refs.

KAPL-2252 OTS $1.00

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MECHANICAL PROPERTIES OF ZIRCALOY-2, NIOBIUM OXYGEN ALLOYS, by A. E. Bibb and J. R. Fascia. Rept. on Contract W31-109-eng-52. 15 Jan 63, 24p. 6 refs. NASA N63-15404.

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Lawrence Radiation Lab., U. of California, Livermore.
COUPLING EFFECTS OF HAFNIUM CONTROL RODS IN A NEAR-HOMOGENEOUS, BeO-MODERATED, ORALLOY-FUELED SYSTEM, by J. M. Piowaty, John R. Morton III, and Loren L. Gardner. Rept. on Contract W7405-eng-48. 27 Feb 63, 10p. 4 refs. NASA N63-15093.

UCRL-6695 OTS $3.00

Lawrence Radiation Lab., U. of California, Livermore.
FISSION DISTRIBUTION IN SEVEN-PIN CLUSTER FUEL ELEMENTS, by Robert Gordon. Rept. on Contract W7405-eng-48. Sep 62, 225p. 37 refs. NASA N63-13612.

UCRL-10614 OTS $3.00

Lawrence Radiation Lab., U. of California, Berkeley.
REACTIVITY LIFETIME AND BURNUP IN NUCLEAR FUELS, by Jean Robert Lefebvre de Ladonchamps. Doctoral thesis. Rept. on Contract W7405-eng-48. 7 Jan 63, 214p. 58 refs. NASA N63-15229.

LAMS-2875 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
LAMPRE PROGRAM. Quarterly status rept. for period ending 20 Feb 63, on Contract W7405-eng-36. Mar 63, 16p. NASA N63-14569.

LAMS-2894 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX). Quarterly status rept. for period ending 20 Mar 63, on Contract W7405-eng-36. Apr 63, 20p. NASA N63-15780.

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Martin Marietta Corp., Baltimore, Md.
SNAP 7D: STRONTIUM-90 FUELED THERMOELECTRIC GENERATOR POWER SOURCE THIRTY-WATT U. S. NAVY FLOATING WEATHER STATION, by C. N. Young. Final rept. on Contract AT(30-1)217. 15 Mar 63, 101p. 16 refs.

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National Lead Co. of Ohio, Cincinnati.
ROTARY ELONGATION OF URANIUM TUBING, by R. B. Steck and H. W. Hesselbrock. Rept. on Contract AT(30-1)1156. 16 Apr 63, 75p. 6 refs.

ORNL-3389 OTS $0.75

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DEVELOPMENT OF A RELIABLE LINE DISCONNECT FOR THE TRANSURANIUM PROCESSING FACILITY, by T. S. Mackey. Rept. on Contract W7405-eng-26. 1963. 24p. NASA N63-12989.

ORNL-3403 OTS $0.75

Oak Ridge National Lab., Tenn.
THE EFFECT OF IRRADIATION ON THE HYDROLYSIS OF URANIUM CARBIDES. I. PREPARATION OF URANIUM MONOCARBIDE PELLETS FOR IRRADIATION, by M. J. Bradley, L. M. Ferris and others. Rept. on Contract W7405-eng-26. 1962. 29p. 7 refs.

ORNL-3261(suppl.) OTS $1.00

Oak Ridge National Lab., Tenn.
LIFETIME STUDIES FOR THE N.S. SAVANNAH REACTOR, by E. E. Gross, M. L. Winton, and B. W. Colston. Rept. on Contract W7405-eng-26. 1962. 40p. 18 refs.

ORNL-3416 OTS $2.50

Oak Ridge National Lab., Tenn.
MARITIME REACTOR PROGRAM. Annual progress rept. for period ending 30 Nov 62, on Contract W7405-eng-26. 1962, 129p. 40 refs.

ORNL-3401 OTS $2.00

Oak Ridge National Lab., Tenn.
NUCLEAR SAFETY PROGRAM. Semiannual progress rept. for period ending 31 Dec 62, on Contract W7405-eng-26. 1963. 82p. 24 refs.

IDO-16819 OTS $2.25

Phillips Petroleum Co., Idaho Falls.
AN ANALYSIS OF NONBOILING REACTIVITY FEEDBACK MECHANISMS IN PRESSURIZED POWER EXCURSIONS IN THE SPERT III REACTOR, by Richard W. Garner. Rept. on Contract AT(10-1)205. 18 Jan 63, 108p. 20 refs.

IDO-16844 OTS $0.50

Phillips Petroleum Co., Idaho Falls.
CHEMPUMP PERFORMANCE FOR HIGH TEMPERATURE ORGANIC SERVICE, by R. G. Young. Rept. on Contract AT(10-1)205. 15 Mar 63, 28p. NASA N63-15197.

IDO-16428(Rev. 1) OTS $1.75

Phillips Petroleum Co., Idaho Falls.
IN-TANK IRRADIATION FACILITIES IN THE MTR AND ETR. (STANDARD PRACTICES GUIDE), ed. by A. S. Richardson. Rept. on Contract AT(10-1)205. 15 Mar 63, 70p.

IDO-16850 OTS $0.50

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ORGANIC CAPSULE IRRADIATION IN THE MTR RABBIT FACILITY, by J. R. McGeachin and S. Cohen. Rept. on Contract AT(10-1)205. 1 Mar 63, 15p. 1 ref. NASA N63-15887.

IDO-16845 OTS $0.50

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A PYROLYTIC CAPSULE DESIGN FOR FILM FORMATION STUDIES, by E. Burroughs, S. Cohen, and W. B. Lewis. Rept. on Contract AT(10-1)205. 15 Mar 63, 21p. NASA N63-15541.

IDO-16835 OTS $1.25

Phillips Petroleum Co., Idaho Falls.
REACTOR CORE THERMOCOUPLE LOCATIONS (EOCR INITIAL CORE), by R. G. Young. Rept. on Contract AT(10-1)205. 21 Jan 63, 51p.

IDO-16829 OTS $1.00

Phillips Petroleum Co., Idaho Falls.
SPERT PROJECT, ed. by F. Schroeder. Quarterly technical rept., July-Sep 62, on Contract AT(10-1)205. 28 Feb 63, 42p. 13 refs.

IDO-16836 OTS $1.00

Phillips Petroleum Co., Idaho Falls.
THERMOCOUPLE ATTACHMENT FOR THE INITIAL EOCR CORE, by D. R. Conkling and T. L. Rasmussen. Rept. on Contract AT(10-1)205. 14 Feb 63, 39p.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

PB 163 150 OTS $6.60

DeBell and Richardson, Inc., Hazardville, Conn.
DEVELOPMENT OF RAPID PRODUCTION SYSTEMS FOR LAMINATED NYLON HELMET LINERS, by Stanley A. Margosiak. Final rept. on Contract DA 19-129-qm-828. 11 Aug 60, 65p. AD-249 279.

DESCRIPTORS: *Helmets, Manfacturing methods, *Nylon, *Laminates, Resins, Molding, Colors, Coatings, Molding materials.

Curing agents were found for phenol-formaldehyde-polyvinyl-butyral resin systems which would eventually allow molding satisfactory helmet liners by a 3-minute hot-pull molding cycle. Other resin systems were also investigated in the event that the phenolic-butyral resin systems were not found to be completely satisfactory. The combination of Resinox 488, BRLA-1030, Butvar B-90, and phthalic anhydride into a clear amber-colored solution which was coated onto nylon cloth was satisfactory. Fabricating techniques were developed to handle this resin system with respect to resin application, precuring of coated cloth, preform design, preheat of assembled preform, and molding. This work later included helmet liners with molded-in color and texture. Fundamental objectives were met for improving surface texture and eliminating voids in the liner structure. The 3-minute hot-pull cycle was developed into a successful system applicable to either smooth-surfaced or stippled cavity helmet liner molds. (Author)

PHYSICS

NASA N63-14191 OTS $3.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
EXPERIMENTS ON JET FLOWS AND JET NOISE FAR FIELD SPECTRA AND DIRECTIVITY PATTERNS, by Erik Mollo-Christensen, Marc A. Kolpin, and John R. Martuccelli. Rept. on Grant NsG-31-60. Feb 63, 39p. 10 refs. ASRL TR-1007.

NASA N63-12651 OTS $2.60

Arizona U., Tucson.
QUANTITATIVE CALCULATIONS OF EXCITATION OF CHARACTERISTIC X-RAYS BY ELECTRONS IN THICK TARGETS, by E. J. Suoninen. Rept. on Grant NsG-120-61. [1962] 29p. 23 refs.

NASA N63-13858 OTS $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME ASPECTS OF SPACE COMMUNICATION, by D. G. Brennan, J. C. James and others. Final rept. on Contract NASw-161. 21 Mar 62, 53p. 19 refs.

NASA N63-10999 OTS $4.60

Linfield Research Inst., McMinnville, Ore.
RESEARCH ON SPUTTERING PHENOMENA, SURFACE STABILITY AND VOLTAGE BREAKDOWN FOR ALKALI-COATED REFRACTORY ELECTRODES, by R. W. Strayer, E. C. Cooper and others. Final rept. 1 May 61-30 Apr 62, on Contract NASr-19. [1962] 48p. 17 refs.

NASA N63-14924 OTS $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
COMPARISON OF THE HARTREE-FOCK ORBITAL WITH THE FIRST NATURAL SPIN ORBITAL FOR TWO-ELECTRON SYSTEMS, by George V. Nazaroff and Joseph O. Hirschfelder. Rept. on Grant NsG-275-62(4180) and Contract AF 33(657)7311. 25 Mar 63, 16p. 11 refs. WIS-TCI-12, ser. 3.

Electronics

NASA N63-12963 OTS $2.60

Case Inst. of Tech., Cleveland, Ohio.
GRAVITY-LIKE ELECTROSTATIC PLASMA WAVES IN INHOMOGENEOUS ELECTRIC FIELDS, by F. Winterberg. Technical rept. A-9 on Grant NsG-198-62. June 62, 26p. 3 refs.

NASA N63-12961 OTS $1.60

Case Inst. of Tech., Cleveland, Ohio.
MEASUREMENTS ON CURRENT SHEETS IN PLASMAS, by O. K. Mawardi and M. Naraghi. Technical rept. A-2 on Grant NsG-198-62. Oct 62, 18p. 9 refs.

NASA N63-12965 OTS $9.10

Case Inst. of Tech., Cleveland, Ohio.
A PROBE INVESTIGATION OF HOT SEEDED GASES, by John C. Handley. Technical rept. A-12 on Grant NsG-198-62. Nov 62, 108p. 50 refs.

NASA N63-12033 OTS $5.60

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
MAGNETOSPHERIC INTERCHANGE INSTABILITY FOR AN IDEAL PLASMA, by B. U. O. Sonnerup and M. J. Laird. Rept. on Contract NsG-184-60. Oct 62, 60p. 10 refs. CRSR 130.

NASA N63-12080 OTS $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
AUTOMATIC TUNING SYSTEMS FOR ANTENNAS WITH VARYING IMPEDANCE, by J. F. Shoup. Rept. on Grant NsG-134-61. 15 Nov 62, 64p. 34 refs. Scientific rept. no. 173.

UCRL-10607 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
CONTROLLED THERMONUCLEAR RESEARCH SEMI-ANNUAL REPORT, July-Dec 62, on Contract W7405-eng-48. 16 Jan 63, 101p. 69 refs. NASA N63-14600.

LAMS-2874 OTS $0.75

Los Alamos Scientific Lab., N. Mex.
LASL CONTROLLED THERMONUCLEAR RESEARCH PROGRAM. Quarterly status rept. for period ending 20 Feb 63, on Contract W7405-eng-36. Mar 63, 34p.

AD-402 076 repriced OTS $2.75

Physical Electronics Research Lab., U. of Minnesota, Minneapolis.
STUDY OF ELECTRICAL AND PHYSICAL CHARACTERISTICS OF SECONDARY EMITTING SURFACES, by W. T. Peria. Final rept., 16 Jan-15 Oct 62, on Contract AF 33(657)8040. Mar 63, 123p. 68 refs. ASD-TDR-63-175.

DESCRIPTORS: *Secondary emission, *Solid state physics, Metallic crystals, Titanium, Tungsten, *Gold, Metal films, Dielectric films, *Magnesium compounds, Oxides, Interferometers, Ionic current, Tantalum, Sodium compounds, Chlorides, Crystal lattices, Crystal structure, Electron beams, Surface properties, *Sputtering, *Aluminum compounds.

Slow electron diffraction from the (001) surface of a MgO crystal reveals two different types of surface structure. One is a fc structure with the MgO lattice constant. The other has a double spacing in those azimuths for which the sum of the indices is even. The effects of heating and sputtering on the pattern from the fc structure are described. The effect of these treatments on the secondary electron emission is also described. A qualitative explanation of the "extra" intensity maxima in slow electron diffraction patterns

is presented. A new model is proposed to explain the major peaks observed in the curves of the variation of secondary emission from single crystals as a function of the angle of incidence of the primary beam. Qualitative explanations of the manner in which the magnitude and width of these peaks vary with primary energy are given in terms of the model. The reason for the differences in the characteristics of the peaks for metals and insulators is also suggested by the model. Using a previous calculation as a starting point, the influence of an internal electric field on the secondary emission from ionic crystals is computed. The results are in fair agreement with experiment for the case of MgO. (Author)

NASA N63-11621 OTS $5.60

Plasmadyne Corp., Santa Ana, Calif.
RECOMBINATION STUDY USING PLASMA ARC, by Che-jen Chen. Final project rept. 2 Dec 60-2 Dec 61, on Contract NAS8-844. 5 Jan 63, 58p. 10 refs. FR-012-844.

NASA N63-12699 OTS $1.60

RAND Corp., Santa Monica, Calif.
IONIZED GASES AT LOW DENSITY IN AXIALLY SYMMETRIC MAGNETIC FIELDS, by L. R. Henrich. Rept. on Contract NASr-21(05). Feb 63, 15p. 6 refs. Memo. RM-3429-NASA.

NASA N63-12035 OTS $4.60

United Aircraft Corp., East Hartford, Conn.
RESEARCH ON THE COLLISION PROBABILITIES OF ELECTRONS AND CESIUM IONS IN CESIUM VAPOR, by R. H. Bullis and R. K. Flavin. Quarterly status rept. no. 1, 1 May-31 July 62, on Contract NASr-112. 31 July 62, 48p. 5 refs. A-920057-1.

Molecular Physics and Spectroscopy

NASA N63-12579 OTS $1.10

Arizona U., Tucson.
WINDOWLESS TUBES FOR X-RAY SPECTROSCOPY, by Ralph W. G. Wyckoff and Franklin D. Davison. Rept. on Grant NsG-120. [1962] 6p.

NASA N63-13640 OTS $1.60

Barnes Engineering Co., Stamford, Conn.
INFRA-RED AND ELECTRO-OPTICS. TEST AND EVALUATION OF AN ULTRAVIOLET OBJECTIVE SPECTROGRAPH, by W. A. Parrilla. Rept. on Contract NAS5-1897. 10 Jan 62, 19p. BEC-4674.

NASA N63-14224 OTS $2.60

National Bureau of Standards, Washington, D. C.
VACUUM ULTRAVIOLET ABSORPTION SPECTRA OF OXYGEN IN LIQUID AND CRYSTALLINE ARGON AND NITROGEN, by Arnold M. Bass. Technical rept. 20 Mar 63, 21p. 9 refs. NBS-7829; NASA Order R-64.

AD-289 175 OTS $1.60

New York U. Coll. of Engineering, N. Y.
LOW FREQUENCY ABSORPTION PROJECT, by Yardley Beers. Final rept. on Contract AF 49(638)259. 24 Nov 61, 13p. 35 refs. AFOSR 2057; NASA N62-11999.

DESCRIPTORS: *Microwave spectroscopy, Low frequency, Theory, *Deuterated compounds, Hyperfine structure, *Formaldehyde, *Nitrogen compounds, Dioxides, Band spectrum, Nitrogen, Quadrupole moments Resonance, Absorption spectrum

This report summarizes work on: (1) Theory of microwave spectrometers, (2) hyperfine structure of the rotational spectrum of HDO, (3) Rotational spectrum of formaldahyde, (4) S-Band spectrum of nitrogen dioxide, and (5) studies of nitrogen quadrupole resonance in the solid state. (Author)

Optics

NASA N63-14374 OTS $3.60

Inst. of Optics, U. of Rochester, N.Y.
OPTICAL PROPERTIES OF "LIUMOGEN": A PHOSPHOR FOR WAVELENGTH CONVERSION, by N. Kristianpoller and David Dutton. Technical note no. 4 on Contract NASw-107: Mar 63, 31p. 12 refs.

UCRL-10499 OTS $1.75

Lawrence Radiation Lab., U. of California, Berkeley.
ULTRACENTRIFUGE PHOTOELECTRIC SCANNER, SPLIT-BEAM, by Kenneth W. Lamers. Rept. on Contract W7405-eng-48. 9 Oct 62, 65p. 12 refs. NASA N63-16149.

NASA N63-15453 OTS $1.10

Massachusetts Inst. of Tech., Cambridge.
ISOTOPE SHIFT AND SATURATION BEHAVIOR OF THE 1.5 μ TRANSITION OF Ne, by A. Szoke (Weizman Inst.) and A. Javan. Rept. on Grant NsG-330. 26 Apr, 63, 10p. 7 refs.

Solid State Physics

NYO-10088 OTS $2.75

Fundamental Methods Associates, New York.
FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING, by Carl N. Klahr. Annual rept. for Dec 61-Dec 62 on Contract AT(30-1)2914. 31 Dec 62, 16 refs. 167p. NASA N63-14216.

UCRL-7184 OTS $0.75

Lawrence Radiation Lab., U. of California, Livermore.
AN INVESTIGATION OF INTERSTITIAL SITES IN THE BCC LATTICE, by Daniel N. Beshers. Rept. on Contract W7405-eng-48. 4 Jan 63, 32p. 25 refs.

PB 163 166 OTS $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MEASUREMENT TECHNIQUES FOR ELECTRICAL RESISTIVITY, HALL COEFFICIENT, SEEBECK COEFFICIENT AND THERMAL CONDUCTIVITY (I). ANALYSIS AND PROPERTIES OF COMPOUND SEMICONDUCTORS (II). THE THERMOELECTRIC HEAT PUMP AND GENERATOR (III), by Theodore C. Harman. Rept. on Contract AF 19(604)5200. 17 June 60, 63p. 6 refs. Rept. no. 83G-0019; AD-238 757.

DESCRIPTORS: *Semiconductors, Theory, *Thermoelectricity, Electrical properties, Heat transfer, Electrical conductance, Measurement, Resistance, *Energy conversion, *Hall effect.

These notes are based on several lectures which the author will present at the University of Michigan in a course on semiconductor theory and technology.

July 11-23, 1960. The presentation will be held to as elementary level as is possible with the topics under consideration. The unusual notation conformed to that used in the course and was a result of the large area of semiconductor technology covered by the lectures. Measurement of semiconductor bulk properties are used for characterization of materials and for device design. The purpose of these lectures is not to describe the many experimental designs which have been employed, but to discuss the underlying principles upon which the measurements are based. Applications of the principles are illustrated by using experimental arrangements, which the author has found useful. (Author)

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Space, Plasma and Radiation Lab., U. of Colorado, Boulder.
DISPERSION THEORY FOR METALS IN THE FAR ULTRAVIOLET, by Edward J. Leonard, Jr. Scientific rept. no. 2, 1 Mar-15 Oct 61, on Contract AF 19(604)5533. Nov 61, 53p. 111 refs. AFCRL 1047.

DESCRIPTORS: *Metals, *Ultraviolet radiation, Scattering, Theory, Reflection, *Quantum mechanics, *Quantum statistics, *Solid state physics, Optics, Electromagnetic fields, Solids, Alloys, Electrons, Lattices, Relaxation time, Brillouin zones, Damping, Harmonic oscillators, Surfaces, Statistical distributions, Statistical functions, Green's function, Partial differential equations, Perturbation theory, Fourier analysis, Transformations (Mathematics)

This report outlines in a convenient and integrated form those aspects of theoretical physics which are relevant to the study of the interaction of ultraviolet radiation with metals by way of reflectivity experiments. More specifically, the theoretical presentations are oriented towards the determination of a formula for frequency dependent reflectivity in such a way as to make this difficult study more easily accessible. The theory begins with Drude's very comprehensive and almost unknown generalized classical dispersion theory, and moves through elementary one-body mechanics to the more advanced many-body treatments which include quantum statistical mechanics and field theory techniques. Only the barest outline of the more complex methods is indicated because it is felt the comparatively simpler bound harmonic oscillator and one-body quantum mechanical band models may be for the present, more successfully applied to complex metals. Various approximations are suggested. A brief discussion of surface effects concludes this survey. (Author)

NASA N63-12099 OTS $6.60

Cryogenic Engineering Lab. National Bureau of Standards, Boulder, Colo.
SURVEY OF CRYOGENIC INSTRUMENTATION. Supplement no. 1 on NASA Order R-13. 1 May 62, 63p. 59 refs.

UCRL-10527 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
DOWNFLOW BOILING OF n-BUTANOL IN A UNIFORMLY HEATED TUBE, by Graham F. Somerville. Master's thesis. Rept. on Contract W7405-eng-48. 29 Oct 62, 105p. 36 refs. NASA N63-13564.

PB 163 167 OTS $5.60

Low Temperature Lab. [William Marsh] Rice [U] Houston, Tex.
LOW TEMPERATURE PHYSICS, by Charles F. Squire. Annual progress rept. for 1949 on Contract N6onr-224, T.O. 3. 15 Feb 50, 60p. 29 refs. AD-121 132.

DESCRIPTORS: *Low temperature research, *Physics, *Cryogenics, *Superconductivity, *Ultrasonic radiation, Attenuation, Superconductors, Rotation, Oscillation, Magnetic properties, *Magnetic fields, Electromagnetic properties, Inductance, *Barium compounds, *Titanates, Dielectric properties, *Ceramic materials, Thermodynamics, *Liquified gases, *Helium, Thermal conductivity, Cryostats, *Tin, Spheres

Contents:
Magnetic effects of a rotating superconductor, pub. in The Physical Review 76:305, 15 July 49
Electromagnetic induction in a superconductor, pub. in The Physical Review 76:685-686, 1 Sep 49
The dielectric properties of barium titanate at low temperatures, pub. in The Physical Review 76:1202-1204, 15 Oct 49
Ultrasonic attenuation change in passing from normal to superconducting state
Torsion pendulum studies on superconducting solid tin spheres in a magnetic field
Dielectric and electro-caloric properties of barium titanate
Liquid helium, heat conductivity in helium I
Liquid helium, new measurements on the dielectric constant

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AD-DIVISION INDEX

AD No.	Div.
336 049	6
402 516	26
402 517	7
402 518	16
402 519	16
402 520	30
402 521	26
402 522	25
402 523	16
402 544	32
402 580	17
402 581	9
402 582	9
402 586	2
402 587	25
402 588	9
402 589	2
402 590	17
402 591	26
402 592	13
402 595	4
402 596	9
402 597	32
402 598	9
402 599	30
402 600	17
402 601	31
402 605	25
402 608	1
402 610	1
402 611	30
402 612	12
402 616	25
402 617	15
402 618	18
402 619	17
402 620	16
402 623	8
402 624	30
402 625	5
402 626	18
402 627	30
402 630	17
402 634	22
402 636	17
402 639	7
402 643	15
402 644	15
402 645	15
402 646	30
402 647	30
402 648	30
402 655	8
402 656	7
402 659	30
402 660	30
402 661	30
402 662	30
402 663	15
402 666	27
402 667	4
402 668	20
402 670	9
402 671	16
402 672	28
402 674	20
402 676	8
402 677	8
402 678	31
402 679	26
402 680	25
402 682	8
402 683	7
402 684	12
402 685	13
402 686	26
402 691	22
402 692	1
402 693	14
402 694	15
402 695	20
402 696	2
402 697	8
402 698	9
402 699	19
402 700	1
402 704	2
402 706	2
402 708	25
402 709	14
402 710	3
402 711	1
402 712	16
402 714	14
402 715	22
402 716	8
402 728	25
402 732	23
402 734	8
402 735	7
402 736	16
402 737	7
402 738	27
402 739	8
402 745	27
402 748	11
402 751	1
402 753	2
402 754	16
402 755	14
402 757	8
402 758	16
402 759	16
402 762	16
402 767	12
402 768	9
402 772	18
402 774	1
402 775	10
402 776	8
402 777	1
402 778	15
402 779	10
402 780	17
402 781	30
402 782	14
402 783	14
402 784	25
402 785	10
402 786	28
402 787	30
402 788	30
402 789	30
402 790	15
402 791	28
402 792	30
402 793	17
402 794	16
402 796	17
402 797	17
402 799	4
402 800	10
402 801	26
402 803	25
402 804	15
402 806	15
402 807	12
402 808	22
402 809	25
402 810	12
402 811	22
402 813	1
402 815	7
402 816	2
402 823	30
402 825	15
402 831	2
402 834	5
402 836	24
402 838	7
402 839	2
402 843	28
402 845	15
402 854	17
402 858	2
402 870	16
402 884	7
402 885	8
402 886	8
402 887	8
402 888	30
402 890	8
402 892	28
402 893	27
402 894	30
402 896	25
402 898	30
402 900	30
402 901	30
402 902	30
402 903	30
402 904	30
402 905	16
402 906	25
402 909	12
402 910	32
402 913	16
402 914	18
402 917	32
402 918	30
402 923	16
402 925	25
402 926	25
402 928	8
402 932	25
402 933	12
402 934	29
402 935	9
402 937	25
402 939	8
402 950	15
402 952	24
402 953	8
402 961	16
402 963	2
402 969	14
402 971	16
402 972	17
402 973	23
402 974	4
402 981	7
402 983	4
402 990	32
402 991	33
402 992	32
402 997	25
402 998	9
403 001	25
403 004	8
403 006	8
403 012	2
403 013	2
403 014	8
403 016	8
403 020	20
403 022	20
403 025	8
403 026	28
403 028	20
403 029	4
403 030	30
403 032	22
403 033	8
403 038	20
403 045	30
403 049	9
403 052	30
403 053	8
403 054	2
403 057	12
403 060	31
403 063	26
403 071	18
403 073	20
403 074	17
403 075	33
403 077	27
403 084	2
403 090	2
403 102	2
403 103	2
403 107	30
403 108	16
403 109	16
403 110	16
403 111	8
403 112	32
403 113	13
403 114	2
403 115	12
403 117	8
403 118	16
403 119	16
403 120	8
403 122	14
403 123	22
403 125	8
403 127	25
403 128	2
403 130	25
403 133	25
403 134	12
403 135	30
403 136	8
403 137	25
403 140	2
403 141	2
403 142	26
403 143	2
403 144	17
403 146	9
403 152	7
403 263	22
403 264	25
403 265	4
403 271	16
403 274	16
403 275	16
403 276	20
403 279	8
403 282	16
403 285	12
403 286	30
403 287	12
403 291	8
403 310	27
403 311	27
403 312	27
403 324	8
403 325	13
403 326	30
403 329	17
403 331	14
403 332	2
403 334	15
403 335	2
403 336	31
403 339	5
403 342	13
403 343	4
403 344	23
403 345	14

AD No.	Div.
403 346	4
403 347	9
403 348	32
403 351	9
403 355	14
403 356	7
403 357	26
403 358	20
403 359	4
403 360	14
403 361	14
403 362	8
403 365	9
403 366	8
403 367	18
403 369	25
403 370	17
403 371	20
403 374	25
403 375	8
403 376	4
403 380	16
403 381	28

AD No.	Div.
403 384	30
403 385	30
403 387	12
403 390	8
403 392	25
403 394	17
403 395	17
403 397	30
403 398	2
403 400	7
403 401	16
403 402	16
403 403	8
403 407	4
403 409	4
403 410	25
403 411	20
403 412	30
403 419	17
403 423	30
403 426	15
403 428	30
403 430	30

AD No.	Div.
403 433	12
403 434	17
403 435	30
403 436	25
403 437	25
403 440	31
403 441	26
403 442	8
403 443	10
403 444	8
403 445	13
403 446	14
403 447	4
403 451	30
403 453	7
403 454	8
403 455	8
403 456	27
403 458	8
403 459	27
403 460	9
403 461	2
403 462	12
403 [illegible]	28

AD No.	Div.
403 465	7
403 466	8
403 469	25
403 470	8
403 471	2
403 474	25
403 475	8
403 476	8
403 478	8
403 479	8
403 480	31
403 481	16
403 482	8
403 484	30
403 485	20
403 486	9
403 489	6
403 490	15
403 492	25
403 493	26
403 494	28
403 495	30
403 496	9
403 498	9

NUMBER INDEX

Number	Page
AD-159 494	S-11
AD-232 342	S-12
AD-235 437	S-9
AD-238 757	S-24
AD-249 279	S-21
AD-269 012	S-24
AD-272 832	S-13
AD-289 175	S-23
AD-400 559	S-9
AD-400 560 repriced	S-7
AD-401 644 repriced	S-13
AD-401 871 repriced	S-12
AD-402 076 repriced	S-22
AD-402 126 repriced	S-13
AD-402 386 repriced	S-2
AD-402 638	S-3
AD-402 695	S-18
AFCRL 1047	S-24
AFOSR 2057	S-23
AFOSR-4634	S-1
AGN-TM-400	S-18
ANL-6107	S-18
ANL-6411	S-18
ANL-6489	S-18
ANL-6560	S-14
ANL-6606	S-18
ANL-6625	S-13
ANL-6630	S-14
ANL-6640	S-18
ANL-6664	S-18
ANL-6667	S-13
ANL-6675	S-18
ANL-6685	S-14
ANL-6688	S-2
ANL-6690	S-18
ANL-6692	S-18
ANL-6698	S-18
ANL-6700	S-17
ANL-6705	S-18
ARF-3194-7	S-2
ASD TDR-63-175	S-22
ASD TDR-63-221	S-13
ASD TDR-63-244	S-18
ASD TDR-62-791	S-13
ASD TDR-62-882	S-9
ASD TDR-62-1072	S-7
ASRL TR-1007	S-22
BAW-1266	S-19
BEC-4674	S-23
BMI-1623	S-19
BMI-1625	S-19
BMI-1626	S-14
BN 290	S-1
BN 291	S-2
BNL-756	S-19
BNL-759(S-62)	S-19
BNL-770(T-288)	S-15
BNL-772	S-17
BNL-774	S-19
BNL-779	S-1
BNL-788	S-19
BNL-790	S-15
BNL-C-35	S-19
BNL-C-37	S-15
BNL-PR-1	S-19
BNL-T-288	S-15
BNL-T-290	S-17
BNL-T-291	S-19
BNL-T-295	S-1
CCC 1024-TR-240	S-4
CRSR-130	S-22
DP-732	S-16
DP-757	S-16
DP-806	S-16
DSR-8836	S-13
EOS 2080-IR-1	S-9
ESL-MIT-R-137	S-13
ESL-MIT-SR-157	S-9
GA-3409	S-15
GCA TR-62-6-N	S-1
GEAP-3914	S-20
GEAP-4098	S-20
GEMP-76	S-19
GEMP-186	S-19
HASL-135	S-15
HW-68525	S-15
HW-70543	S-15
HW-71023	S-14
HW-71044	S-13
HW-74304	S-20
HW-75806	S-15
HW-76323	S-15
HW-76646	S-20
HW-76952	S-14
IBM MC-102	S-10
IBM MC-104	S-10
IDO-12029	S-17
IDO-14598	S-16
IDO-14603	S-5
IDO-16428(Rev. 1)	S-21
IDO-16809	S-9
IDO-16819	S-21
IDO-16829	S-21
IDO-16835	S-21
IDO-16836	S-21
IDO-16844	S-21
IDO-16845	S-21
IDO-16850	S-21
IDO-16851	S-3
IDO-28578	S-18
IL E-1172	S-2
IL R-367	S-14
IM-89/UR (Standing wave indicator)	S-8
IRL 173	S-22
JPL SPS-37-20, v. 3	S-10
JPL TR-32-131	S-10
JPL TR-32-217	S-20
JPL TR-32-325, rev.	S-10
JPL TR-32-347	S-2
JPL TR-32-350	S-9
JPL TR-32-375	S-11
JPL TR-32-377	S-10
JPL TR-32-381	S-12
JPL TR-32-384, rev.	S-10
JPL TR-32-385	S-11
JPL TR-32-387	S-14
JPL TR-32-394	S-12
JPRL TR-32-284	S-10
JPLA1/LS-205	S-2
KAPL-2165-1	S-15
KAPL-2216	S-14
KAPL-2217	S-15
KAPL-2252	S-20
KM-DIG-TD-14	S-20
LA-2390(suppl.)	S-16
LA-2414	S-12
LA-2858	S-17
LA-2880	S-14
LAMS-2826	S-14
LAMS-2873	S-16
LAMS-2874	S-22
LAMS-2875	S-20
LAMS-2894	S-20
LF-6	S-3
LL 83G-0019	S-24
Martin ER-12693	S-10
MH MPG-1529-TR7	S-9
MND-P-2835	S-20
MURA-666	S-17
NAA-SR-7660	S-15
NAA-SR-7752	S-15
NAA-SR-7770	S-15
NAA-SR-7797	S-19
NAA-SR-7925	S-19
NAA-SR-7973	S-19
NAA-SR-8097	S-19
NAA-SR-8140	S-19
NAA-SR-8171	S-19
NASA HR-8	S-11
NASA N62-11999	S-23
NASA N62-14421	S-12
NASA N62-15578	S-5
NASA N62-16428	S-10
NASA N62-17486	S-4
NASA N62-17988	S-10
NASA N63-10549	S-3
NASA N63-10643	S-20
NASA N63-10652	S-20
NASA N63-10685	S-5
NASA N63-10782	S-10
NASA N63-10957	S-10
NASA N63-10958	S-10
NASA N63-10960	S-10
NASA N63-10999	S-22
NASA N63-11051	S-11
NASA N63-11127	S-2
NASA N63-11192	S-2
NASA N63-11407	S-2
NASA N63-11540	S-1
NASA N63-11585	S-9
NASA N63-11586	S-9
NASA N63-11621	S-23
NASA N63-11697	S-11
NASA N63-11887	S-14
NASA N63-12033	S-22
NASA N63-12035	S-23
NASA N63-12040	S-2
NASA N63-12041	S-1
NASA N63-12043	S-2
NASA N63-12068	S-17
NASA N63-12071	S-1
NASA N63-12077	S-1
NASA N63-12078	S-2
NASA N63-12080	S-22
NASA N63-12086	S-7
NASA N63-12099	S-24
NASA N63-12138	S-5
NASA N63-12152	S-12
NASA N63-12221	S-17
NASA N63-12328	S-16
NASA N63-12339	S-11
NASA N63-12342	S-12
NASA N63-12355	S-11
NASA N63-12356	S-3
NASA N63-12357	S-5
NASA N63-12365	S-11
NASA N63-12366	S-13
NASA N63-12579	S-23
NASA N63-12610	S-17
NASA N63-12611	S-9
NASA N63-12617	S-4
NASA N63-12618	S-1
NASA N63-12619	S-1
NASA N63-12632	S-3
NASA N63-12649	S-4
NASA N63-12650	S-4
NASA N63-12651	S-22
NASA N63-12655	S-12
NASA N63-12657	S-3
NASA N63-12699	S-23
NASA N63-12707	S-4
NASA N63-12776	S-14
NASA N63-12777	S-2
NASA N63-12796	S-2
NASA N63-12806	S-4
NASA N63-12822	S-25
NASA N63-12825	S-3
NASA N63-12829	S-4
NASA N63-12961	S-22
NASA N63-12962	S-15
NASA N63-12963	S-22
NASA N63-12964	S-9
NASA N63-12965	S-22
NASA N63-12989	S-20
NASA N63-12990	S-16
NASA N63-13072	S-10
NASA N63-13081	S-11
NASA N63-13082	S-11
NASA N63-13225	S-24
NASA N63-13250	S-16
NASA N63-13263	S-11
NASA N63-13440, rev.	S-10
NASA N63-13449, rev.	S-10
NASA N63-13564	S-24
NASA N63-13612	S-20
NASA N63-13623	S-10
NASA N63-13640	S-23
NASA N63-13704	S-2
NASA N63-13774	S-18
NASA N63-13843	S-1
NASA N63-13845	S-2
NASA N63-13858	S-22
NASA N63-13961	S-9
NASA N63-13975	S-13
NASA N63-14083	S-16
NASA N63-14189	S-15
NASA N63-14191	S-22
NASA N63-14206	S-20
NASA N63-14211	S-17
NASA N63-14216	S-23
NASA N63-14224	S-23
NASA N63-14281	S-16
NASA N63-14308	S-15
NASA N63-14340	S-9
NASA N63-14374	S-23
NASA N63-14411	S-10
NASA N63-14413	S-11
NASA N63-14450	S-9
NASA N63-14465	S-14
NASA N63-14466	S-10
NASA N63-14467	S-12
NASA N63-14483	S-11
NASA N63-14546	S-10
NASA N63-14556	S-17
NASA N63-14557	S-17
NASA N63-14562	S-13
NASA N63-14564	S-18
NASA N63-14568	S-16
NASA N63-14569	S-20
NASA N63-14573	S-18
NASA N63-14591	S-10
NASA N63-14597	S-1
NASA N63-14598	S-3
NASA N63-14599	S-17
NASA N63-14600	S-22
NASA N63-14631	S-2
NASA N63-(14632-14636)	S-2
NASA N63-14644	S-3
NASA N63-14665	S-3
NASA N63-14677	S-2
NASA N63-14710	S-14
NASA N63-14711	S-12
NASA N63-14713	S-1
NASA N63-14723	S-18
NASA N63-14724	S-19
NASA N63-14792	S-4
NASA N63-14793	S-4
NASA N63-14863	S-15
NASA N63-14890	S-19
NASA N63-14898	S-12
NASA N63-14899	S-5
NASA N63-14901	S-1
NASA N63-14924	S-22
NASA N63-14947	S-17
NASA N63-(14948-14949)	S-17
NASA N63-14951	S-15
NASA N63-14962	S-14
NASA N63-14963	S-19
NASA N63-14970	S-15
NASA N63-14977	S-12
NASA N63-15001	S-19
NASA N63-(15002-15024)	S-19
NASA N63-15032	S-11
NASA N63-15042	S-1
NASA N63-15092	S-3
NASA N63-15093	S-20
NASA N63-15103	S-15
NASA N63-15197	S-21
NASA N63-15218	S-13
NASA N63-15220	S-16
NASA N63-15229	S-20
NASA N63-15243	S-10
NASA N63-15244	S-10
NASA N63-15250	S-2
NASA N63-15258	S-3
NASA N63-15281	S-10
NASA N63-15301	S-4
NASA N63-15317	S-12
NASA N63-15325	S-13
NASA N63-15365	S-14
NASA N63-15375	S-14
NASA N63-15380	S-14
NASA N63-15392	S-24
NASA N63-15404	S-20
NASA N63-15410	S-15
NASA N63-15453	S-23
NASA N63-15462	S-14
NASA N63-15464	S-12
NASA N63-15531	S-19
NASA N63-15538	S-17
NASA N63-15540	S-16
NASA N63-15541	S-21
NASA N63-15542	S-3
NASA N63-15551	S-3
NASA N63-15552	S-14
NASA N63-15614	S-16
NASA N63-15618	S-17
NASA N63-15654	S-13
NASA N63-15674	S-20
NASA N63-15675	S-15
NASA N63-15722	S-14
NASA N63-15730	S-20
NASA N63-15780	S-5
NASA N63-15787	S-14
NASA N63-15790	S-16
NASA N63-15810	S-19
NASA N63-15823	S-9
NASA N63-15886	S-21
NASA N63-15887	

Number	Page
NASA N63-15929	S-14
NASA N63-15934	S-19
NASA N63-15937	S-18
NASA N63-15966	S-2
NASA N63-16124	S-17
NASA N63-16149	S-23
NASA N63-16269	S-9
NASA Order R-13	S-24
NASA Order R-39	S-3
NASA Order R-45, PR-8	S-24
NASA Order R-46	S-1
NASA Order R-56	S-4
NASA Order R-56	S-4
NASA Order R-64	S-23
NAVDOCKS P-708.0	S-6
NAVDOCKS P-708.1	S-6
NAVDOCKS P-712superseded	S-6
NAVDOCKS P-712.0	S-6
NAVDOCKS P-712.1	S-6
NAVWEPS 17-20AE-28	S-8
NAVEWPS 17-20AG-51	S-7
NAVWEPS 17-20AG-66	S-8
NAVWEPS 17-20AP-02	S-7
NAVWEPS 17-20AP-03	S-8
NAVWEPS 17-20AP-04	S-8
NAVWEPS 17-20AQ-20	S-7
NAVWEPS 17-20AQ-21	S-7
NAVWEPS 17-20AY-01	S-8
NAVWEPS 17-20AY-06	S-7
NAVWEPS 17-20AY-12	S-9
NAVWEPS 17-20GV-06	S-8
NBL-191	S-3
NBL-194	S-3
NBS 7641	S-24
NBS 7829	S-23
NLCO-863	S-20
NP-6464	S-11
NSL(Northrop) 62-125-2	S-3
NSL(Northrop) 62-228	S-11
NYO-10088	S-23
ORA 03424-7-T	S-20
ORNL-3261(suppl.)	S-21
ORNL-3278	S-4
ORNL-3365	S-16
ORNL-3389	S-20
ORNL-3397	S-3
ORNL-3399	S-13
ORNL-3401	S-21
ORNL-3403	S-21
ORNL-3406	S-16
ORNL-3412	S-16
ORNL-3416	S-21
ORO-598	S-1
PB 139 129 superseded	S-6
PB 139 130 superseded	S-6
PB 145 007 superseded	S-6
PB 145 008 superseded	S-6
PB 148 769 see PB 163 164	S-8
PB 163 105	S-9
PB 163 114	S-4
PB 163 130	S-12
PB 163 149	S-25
PB 163 150	S-21
PB 163 164	S-8
PB 163 165	S-5
PB 163 166	S-24
PB 163 167	S-24
PB 163 168	S-11
PB 181 126-1 Rev.	S-6
PB 181 126-1 superseded	S-6
PB 181 127-1 Rev.	S-6
PB 181 127-1 superseded	S-6
PB 181 128-2 Rev.	S-6
PB 181 128-2 superseded	S-6
PB 181 488	S-8
PB 181 489	S-7
PB 181 490	S-8
PB 181 491	S-7
PB 181 492	S-8
PB 181 493	S-8
PB 181 494	S-7
PB 181 495	S-7
PB 181 496	S-8
PB 181 497	S-7
PB 181 498	S-9
PB 181 499	S-8
PB 181 500	S-5
PB 181 507	S-6
Plasma FR012-844	S-23
PMU-4062	S-16
PWA 2088	S-11
QMFCIAF LB-7	S-25
R62DM238	S-3
R62SD84	S-1
RADC TDR-62-65	S-13
RAND AR-26-JPL	S-2
RAND RM-3140-NASA	S-2
RAND RM-3429-NASA	S-23
RIAS TR-62-18	S-12
RLE 354	S-9
SAO SR-114	S-10
SAO SR-116	S-10
SC-478(RR)	S-14
SCR-317	S-25
SCR-483	S-12
SCR-501	S-12
SCTM-71-63(24)	S-24
SG-21/U (Signal generator)	S-7
SG-21/U (Signal generator)	S-8
SLAC-5	S-17
SLAC-7	S-17
SLAC-8	S-17
SLAC-11	S-17
SLAC-12	S-17
SLAC-13	S-16
SLAC-14	S-17
SRI 3652 FR, pt. 1	S-11
SRI 3652, FR, pt. 2	S-11
SRO-78	S-15
SSL(UC) 3-25	S-3
STL 8659-6016-RU-000	S-11
SUI 62-23-B	S-5
SUI 62-31	S-16
TID-4550(9th Rev.)	S-25
TID-16315(del.)	S-19
TID-18124	S-17
TID-18125	S-4
TID-18126	S-16
TS-585/U (Output meter)	S-8
TS-1294A/U (Transistor set)	S-9
UCRL-5705(suppl. 2)	S-1
UCRL-6695	S-20
UCRL-7160	S-1
UCRL-7165	S-3
UCRL-7184	S-23
UCRL-7204	S-3
UCRL-7223	S-17
UCRL-7262	S-20
UCRL-10022	S-15
UCRL-10462	S-16
UCRL-10499	S-23
UCRL-10527	S-24
UCRL-10607	S-22
UCRL-10614	S-20
UCRL-10630	S-16
UCRL-10634	S-2
UCRL-10649	S-16
UCRL-10673	S-16
UNAIR A-920057-1	S-23
UNM PR-EE-39	S-2
USBM-U-1031	S-14
WIS TCI-12, ser. 2	S-22
Y-1400	S-12
Y-1414	S-4
Y-1415	S-4

SUBJECT INDEX

Subject	Page	Number
Abstracts	S-3	AD-402 638
Aircraft canopies	S-12	PB 163 130
Alcohols	S-5	PB 163 165
Aluminum compounds	S-22	AD-402 076
Ammeters	S-7	PB 181 494
AN/FPS-16	S-8	PB 163 164
AN/USM-31(Test set)	S-7	PB 181 497
Aromatic compounds	S-12	AD-401 871
Artificial precipitation	S-5	PB 163 165
Barium compounds	S-24	PB 163 167
Benzenes	S-5	PB 163 165
Bibliographies	S-3	AD-402 638
	S-25	PB 163 149
Borates	S-4	PB 163 114
Butadienes	S-11	PB 163 168
Calorimeters	S-7	PB 181 491
Catalysts	S-11	PB 163 168
Ceramic materials	S-24	PB 163 167
Civil engineering	S-6	PB 181 126-1 Rev.
		PB 181 127-1 Rev.
Clouds	S-5	PB 163 165
Coaxial cables	S-13	AD-272 832
Color temperature	S-9	AD-400 559
Complex compounds	S-4	PB 163 114
Computer storage devices	S-13	AD-401 644
Continuum mechanics	S-13	AD-402 126
Control systems	S-2	AD-402 386
Cryogenics	S-13	AD-272 832
	S-24	PB 163 167
Data storage systems	S-13	AD-272 832
		AD-401 644
Delay lines	S-13	AD-272 832
Deuterated compounds	S-23	AD-289 175
Dispersion theory	S-24	AD-269 012
Display systems	S-2	AD-402 386
Ecology	S-3	AD-402 638
Elastomers	S-11	PB 163 168
Electrical networks	S-7	AD-400 560
	S-9	PB 163 105
Electron tubes	S-7	PB 181 497
	S-8	PB 181 496
Electronic circuits	S-9	PB 163 105
Energy conversion	S-18	AD-402 695
	S-24	PB 163 166
Epoxy resins	S-12	PB 163 130
Formaldehyde	S-23	AD-289 175
Fracture (Mechanics)	S-13	AD-402 126
Friedel-Crafts reactions	S-11	PB 163 168
Gas chromatography	S-12	AD-401 871
Gold	S-22	AD-402 076
Guided missile tracking systems	S-8	PB 163 164
Hall effect	S-24	PB 163 166
Handbooks	S-6	PB 181 126-1 Rev.
		PB 181 127-1 Rev.
		PB 181 128-2 Rev.
		PB 181 507
Heat resistant plastics	S-4	PB 163 130
	S-11	PB 163 168
Helium	S-24	PB 163 167
Helmets	S-21	PB 163 150
Human engineering	S-2	AD-402 386
	S-3	AD-402 638
Indicating instruments (Electrical)	S-7	
		PB 181 494
		PB 181 495
Isoprene	S-11	PB 163 168
Laminates	S-21	PB 163 150
Liquefied gases	S-24	PB 163 167
Low temperature research	S-24	PB 163 167
Machine shop practice	S-5	PB 181 500
Magnesium compounds	S-22	AD-402 076
Magnetic fields	S-24	PB 163 167
Masonry	S-6	PB 181 127-1 Rev.
Measuring devices (Electrical and electronic)	S-8	PB 181 493
Metals	S-24	AD-269 012
Microwave amplifiers	S-9	PB 163 105
Microwave equipment	S-13	AD-272 832
Microwave spectroscopy	S-23	AD-289 175
Naval shore establishments	S-6	PB 181 128-2 Rev.
		PB 181 507
Nitrogen compounds	S-23	AD-289 175
Nuclear energy	S-18	AD-402 695
Nylon	S-21	PB 163 150
Organic compounds	S-12	AD-401 871
Organoboranes	S-4	PB 163 114
Parametric amplifiers	S-9	PB 163 105
Periodicals	S-25	PB 163 149
Pest control	S-6	PB 181 128-2 Rev.
		PB 181 507
Pharmacology	S-3	AD-402 638
Physics	S-24	PB 163 167
Physiology	S-3	AD-402 638
Plastics	S-12	PB 163 130
Polyethylene plastics	S-11	PB 163 168
Power meters	S-7	PB 181 491
Power supplies	S-9	AD-400 559
Probability	S-7	AD-400 560
Psychiatry	S-3	AD-402 638
Psychology	S-3	AD-402 638
Quantum mechanics	S-24	AD-269 012
Quantum statistics	S-24	AD-269 012
Radar equipment	S-8	PB 163 164
Radiation damage	S-11	PB 163 168
Reliability	S-7	AD-400 560
Roads	S-6	PB 181 128-2 Rev.
		PB 181 507
Secondary emission	S-22	AD-402 076
Seebeck coefficient	S-24	PB 163 166
Semiconductors	S-24	PB 163 166
Ships	S-5	PB 181 500
Signal generators	S-7	PB 181 489
	S-8	PB 181 490
Sodium compounds	S-4	PB 163 114
Solar cells	S-9	AD-400 559
Solar radiation	S-9	AD-400 559
Solid state physics	S-22	AD-402 076
	S-24	AD-269 012
Space medicine	S-3	AD-402 638
Sputtering	S-22	AD-402 076
Standing wave indicators	S-8	PB 181 499
Styrene plastics	S-11	PB 163 168
Superconductivity	S-24	PB 163 167
Test equipment (Electronics)	S-8	PB 181 496
Test sets	S-7	PB 181 497
	S-9	PB 181 498
Thermodynamics	S-4	PB 163 114
Thermoelectricity	S-24	PB 163 166
Thermosetting resins	S-12	PB 163 130
Tin	S-24	PB 163 167
Titanates	S-24	PB 163 167
Tracking	S-8	PB 163 164
Training	S-2	AD-402 386
Transistors	S-9	PB 181 498
Ultrasonic radiation	S-24	PB 163 167
Ultraviolet radiation	S-24	AD-269 012
Voltmeters	S-7	PB 181 494
		PB 181 495
	S-8	PB 181 488
Wattmeters	S-8	PB 181 492
ZhRD chamber	S-71	Il'yashenko
Ziegler catalysts	S-11	PB 163 168

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